TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

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DETROIT

On all your work over jobs-
RIG UP RIGHT with
BJ PRODUCTION TOOLS!

BJ TUBING HOOKS

30, 50 and 75-ton capacities with either Single or Duplex body. Fully enclosed relief spring in "50" and "75" cushions the load. Built-in locking arm forms a safe, strong C-Link on single body type. All sizes swivel on enclosed heavy-duty ball bearings.

BJ ROD HOOKS

From light to heavy loads, the BJ "10", "15" and "20" are the ideal hoisting tools. Streamlined design makes for easy handling. Ball bearings are fully enclosed. Locking arm guides bail and closes *automatically* with weight of load, can only be opened manually. Safe, convenient.

Get your wells back on production faster. For derrick equipment engineered to speed up well pulling jobs —*standardize on the complete BJ line.* See your nearby BJ representative now!

BJ TUBING ELEVATORS

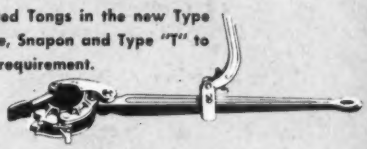
In light and heavy-duty single bail types for every tubing job.

BJ ROD ELEVATORS

Reversible flame-hardened seating surface provides double the usual life. Made to fit all rod tapers.

BJ TUBING TONGS

Hand-operated Tongs in the new Type WS Wideface, Snapon and Type "T" to meet every requirement.



BJ *MEANS ENGINEERED OIL TOOLS*

Byron Jackson Co.

Since 1872

Main Office & Plant: Los Angeles 54, Calif.
Mid-Continent Office & Plant, Houston 1, Texas
Export Office: New York 17, New York
JOBBERS ALL PRINCIPAL OIL FIELDS

XUM

101 trained field men

They KNOW!

..that's why they can give you FREE, honest, unbiased and factual answers to all of your packer problems.

"THEY" are the Lane-Wells field men — 101 of them — every man-jack a packer expert, intensively trained to give you "Engineered" Packer Service.

What *is* Engineered Packer Service? Briefly, it is a service which blends latest engineering data with field experience to remove guesswork and "rule of thumb" from all phases of packer application. Available to any operator on request, with no cost or obligation, and without regard to make of equipment used, Engineered Packer Service gives field-proven, *engineered* answers to these seven major packer problems:

1. Do I Really *Need* a Packer? Analysis of well conditions and operations frequently discloses that another piece of equipment will serve you better than a packer. If so, your Lane-Wells man will tell you frankly.
2. What Can a Packer Do For Me? Lane-Wells field men can work out, with you, packer set-ups to handle a wide variety of operations.
3. Which is the *Right* Packer? Your Lane-Wells man, thoroughly trained in all phases of packer applications, will recommend the type and size of packer which meets *your* well conditions and *your* operations.
4. What About Setting the Packer? Working with field-proven engineering data, your Lane-Wells man will help you determine a setting tailored both to your present well conditions and to future operations.
5. Just How Shall We Pull This Packer? Wide experience and up-to-the-minute training enable Lane-Wells men to work out procedures that pull the packer without parting the tubing.
6. Am I Getting the Most From My Packer? Your Lane-Wells man can review your packer set-ups, evaluate their efficiency, and show you just what to expect of a good packer.
7. Is This Packer Still Usable? Many used packers have been saved for further service by Lane-Wells packer experts advising on proper maintenance and on reconditioning in the field and in the shop.

This can give you only a small picture of Engineered Packer Service. Your Lane-Wells man can give you the complete story — call or write him, today.

LOS ANGELES · HOUSTON · OKLAHOMA CITY

LANE WELLS

TECHNICAL OILFIELD SERVICES

General Offices, Export Office and Plant 5610 SO. SOTO STREET, LOS ANGELES 58, CALIFORNIA

Lane-Wells Canadian Co. in Canada · Petro-Tech Service Co. in Venezuela

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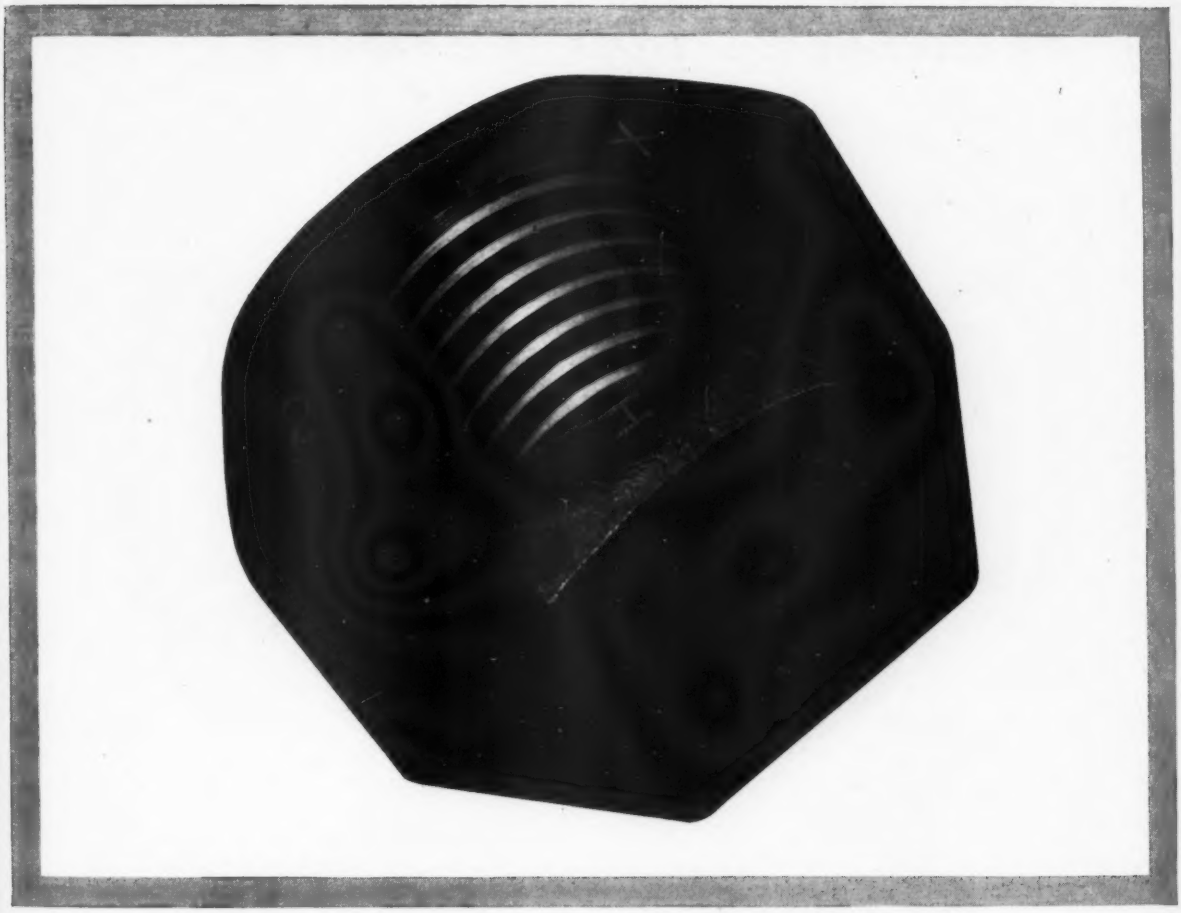

Hot Forged for Strength

There's no cause for concern about premature nut failure when you use the Bethlehem Quenched Nut in high-temperature, high-pressure bolting applications. For this nut can take it.

The Bethlehem Quenched Nut has the ability to stay on the job for long periods of time because of its built-in strength. This is the result of hot forging. Instead of being punched from a hot bar, as is the case with ordinary nuts, the Quenched Nut is made by forging and extruding hot metal into a forming die, after which it is quenched and tempered. This results in a nut sufficiently strong to break virtually any stud or bolt on which it is used.

Besides, the Quenched Nut has a tough grain structure, and its oxidized sides are resistant to corrosion. In addition, it has a ground bearing surface which is vastly superior to common, machined surfaces.

The Quenched Nut is a product of Bethlehem's fastener plant at Lebanon, Pa. It conforms to Grade 2H of ASTM Specification A194, and is carried in stock in bolt sizes from ⅜ in. to 3½ in. Lebanon Plant also stocks nuts in Grades 0, 2, and 4. If you'd like additional information about the Quenched Nut, or any of the other Bethlehem fastener items for high-temperature bolting, put it up to a Bethlehem man, or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Bethlehem supplies every type of Fastener

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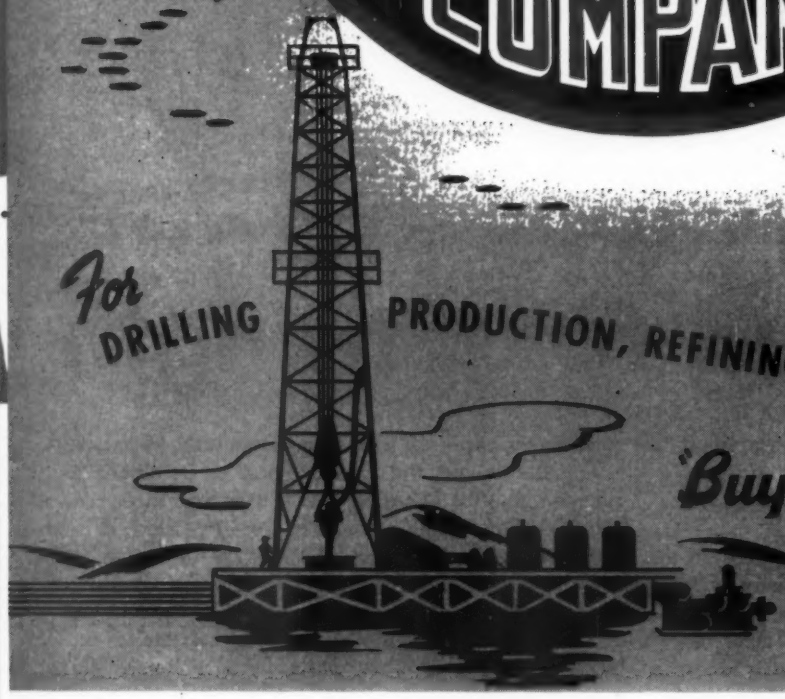
Whatever you need!-

SUPPLY BOVAIRD COMPANY



For DRILLING PRODUCTION, REFINING, or PIPELINE EQUIPMENT

"Buy From Bovaird"

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

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THE Bovaird SUPPLY CO.

GENERAL OFFICES
TULSA, OKLAHOMA

MEMBER PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Where a change to grommet V belts saved $100 a month

THIS drive turns a ball mill containing 22 tons of steel balls, water and ore that grind until the mineral can be separated. Six ordinary belts weren't enough. They were falling to pieces from overwork.

But there wasn't space to expand, and redesigning the drive would cost $800. Ordinary belts lasted only 5 or 6 weeks, replacement costs were over $100 a month. B. F. Goodrich grommet multiple-V belts were installed, are in their sixth month of service, still in good condition. Here's why the grommet construction reduces V belt costs:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B.F.Goodrich has the grommet! — No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). At present made in D and E sections only. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

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WILSON SUPPLY COMPANY

Announces

It has acquired the Distribution of

BRYAN
GAS LIFT EQUIPMENT

WILL NOW BE KNOWN AS

WILSON-BRYAN
GAS LIFT EQUIPMENT

In order to give the oil industry a more complete service on gas-lift equipment the Wilson Supply Company has added Wilson-Bryan Gas-Lift Flow Valves to their other line of gas-lift equipment.

The Wilson Supply Company, a pioneer in the field of gas lifting, recognizes the fact that production problems vary from field to field, and that no single type of gas-lift equipment will efficiently produce all wells. However, with their expanded line of equipment, the Wilson Supply Company feels it is now in a position to equip wells with gas-lift valves that will produce from high or low fluid levels, large or small volumes, and reduce production costs to a minimum.

Among recent developments in Wilson-Bryan Gas Lift Valves are:

(1) A method of producing wells with bellows type flow valves whereby the highest gas pressure is utilized at the lowest valve in the tubing string. Rate of production is controlled by selective operating depth and a clock controlled surface intermitter.

(2) A system whereby a series of bellows type flow valves can be removed from the tubing string without pulling tubing.

(3) A bellows valve that is directly controlled by fluid head in the tubing. This valve operates independent of casing pressure and does not require a clock controlled surface intermitter.

For latest developments in Gas-Lift Equipment —contact your Wilson Supply Store, or write:

WILSON SUPPLY COMPANY

1412 MAURY ST. — HOUSTON, TEX.

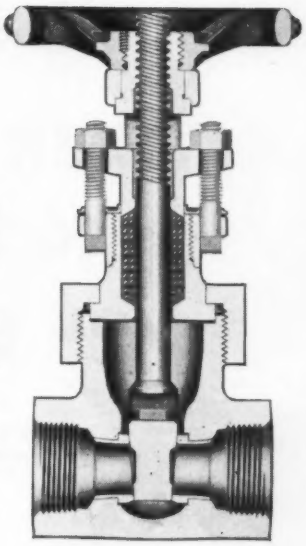
BRYAN GAS LIFT EQUIPMENT CO., FT. WORTH, TEX.

WALLACE ROBERTSON, Dist.
VICTORIA, TEXAS
(Southwest Texas)

HENRY DEAR, Dist.
BAKERSFIELD, CALIF.
(California)

All the piping equipment you need

...on one order to CRANE



No. 3602X or XW
Sizes: ¼ to 2-inch
Screwed or welding ends

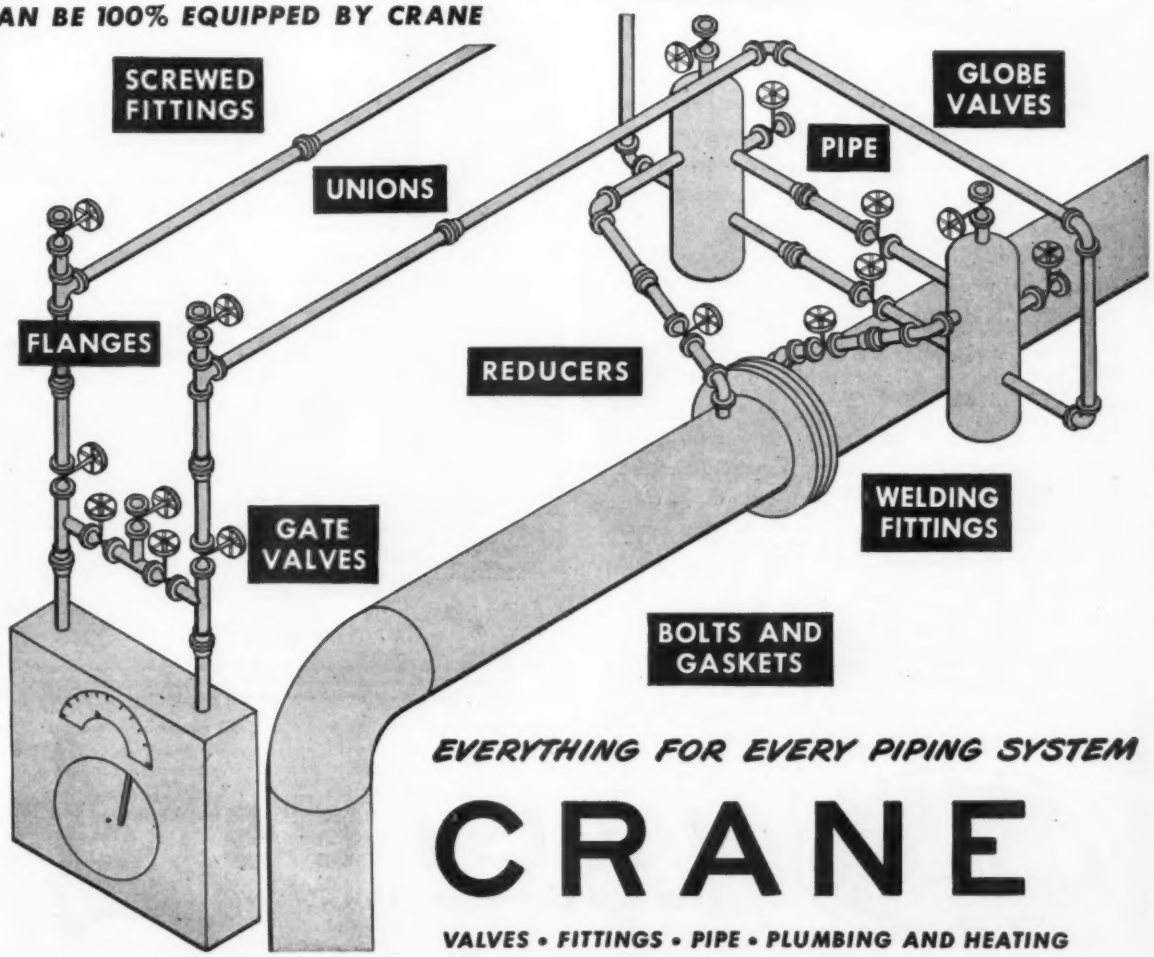
SMALL STEEL VALVES WITH BIG VALVE FEATURES

Crane 600-Pound Small Steel Gates with Union Bonnet—for oil and oil vapor services—are smaller, lighter, and more compact than usual high pressure design. High quality carbon steel body, bonnet, and yoke provide extra strength and safety under rough usage and extreme pressure-temperature conditions.

Seating can be either Crane Exelloy to Exelloy, or Crane Hardened Stainless Steel to Exelloy. Seat rings of heavy section, securely rolled into body, prevent leakage around the ring . . . will not loosen in service. Husky bonnet ring, with long, precision cut threads, pulls up easily—always stays tight. Blowout-proof, soft iron gasket in bonnet joint is unaffected by highest temperatures or fluids on recommended services. For more information, see your Crane No. 49 Catalog or write for Circular AD-1741.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

THIS METER PIPING INSTALLATION, FOR EXAMPLE, CAN BE 100% EQUIPPED BY CRANE



EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

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THEIR JOB is to help you get..

Mr. Claude Waltz, operating a Bullard high-speed boring mill here, started at OIC in 1896, at age 19, as an apprentice machinist.

This new, modern Southwark-Emery physical test machine, in daily use, is one of the many mechanical aids added to the 40 years of precision engineering experience of Messrs. Malaney, Doster and Turner.

Mr. A. A. Kruse, factory trained in precision application of valves, is one of many O. I. C. representatives in various parts of the nation qualified and available to aid both distributors and users in valve application.

Precision Engineering of valve designs, Precision Manufacturing and Precision Application—OIC considers all three factors equally essential to good valving. OIC has the years of experience and the service organization to give you all three.

We point with pride to these veteran members of the OIC organization as evidence: Mr. Claude Waltz has been contributing precision machining for 54 years. Mr. D. B. Malaney, Metallurgist, Mr. H. G. Doster, Vice President in Charge of Engineering, and Mr. J. B. Turner, Product Engineer, combine 40 years of service in precision engineering. Mr. A. A. Kruse, Jr., who began in our Engineering Department, is now one of the many field engineers advising users on precision valve application in various parts of this country.

If you're needing valve *application know-how,* call the nearby OIC distributor for the help of a factory representative, or write direct to us. The Ohio Injector Company, Wadsworth, Ohio.

OIC
FOUNDED 1883

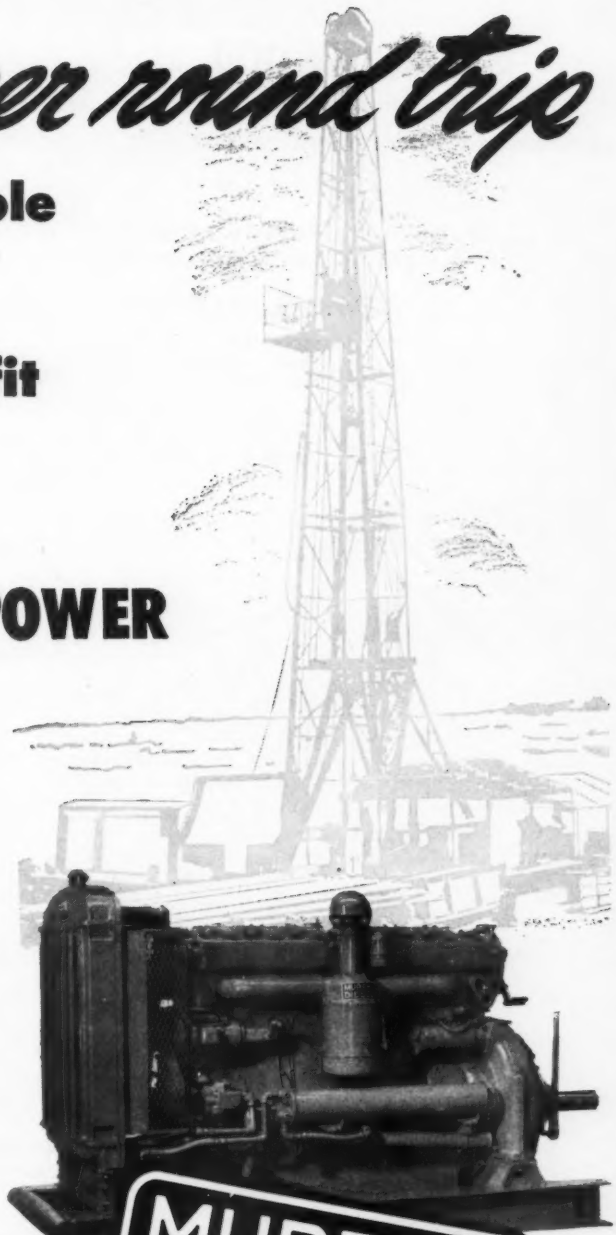
VALVES

FORGED AND CAST STEEL · IRON · BRONZE

Less time per round trip

means more hole per day and more profit for you with

MURPHY DIESEL POWER



WHEN you have Murphy Diesel Power on the end of a string of pipe, you have the kind of power that really takes hold and gets the pipe out in a hurry . . . and that means you'll make more hole in less time. The key to Murphy's responsiveness to power demands is its hydraulic servo-type governor in combination with such features as "true" diesel operation . . . unit fuel injection . . . four valves per cylinder . . . and many others.

Equally important is the Murphy Diesel's dependability and operating economy—it stays on the job longer and costs less per hour to operate.

The 36 page booklet *"10 Questions to Ask a Diesel Engine Salesman"* explains fully the advantages of Murphy Diesel design and what it can mean to you. Ask your Murphy Diesel Dealer for a copy or write direct.

MURPHY DIESEL COMPANY
5305 W. Burnham St., Milwaukee 14, Wisconsin
OIL INDUSTRY FACTORY BRANCH—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma

Sales, Parts and Service:

LOS ANGELES, CALIFORNIA
Engine Sales & Service

AMARILLO, TEXAS
Service & Supply

SAN ANTONIO, TEXAS
J. E. Ingram Equipment Co.

DALLAS, TEXAS
Conley-Lott-Nichols Mach. Co.

EVANSVILLE, INDIANA
Pershing Equipment Co.

MT. VERNON, ILL.
Ed Meyer Tractor Co.

KILGORE, TEXAS
B & G Engine Service

JACKSON, MICH
Utility & Industrial Supply

HOUSTON, TEXAS
Houston Engine & Pump Co., Inc.

ODESSA, TEXAS
Electric Service & Supply Co.

GREAT BEND, KANS.
Manufacturers Dist. Co.

OIL INDUSTRY FACTORY BRANCH—*Sales, Parts and Service:*
113-117 South Elwood Street, Tulsa, Oklahoma

MURPHY DIESEL

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units in 24 models for drilling and pipe line pumping, 1200 and 1400 RPM, 90 to 220 H.P., Diesel Electric Generator Sets 60 to 133 K.W.

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ROCKWOOD announces the appointment of Gustin - Bacon Mfg. Co. as exclusive mid-continent distributor of Rockwood Portable fire fighting equipment

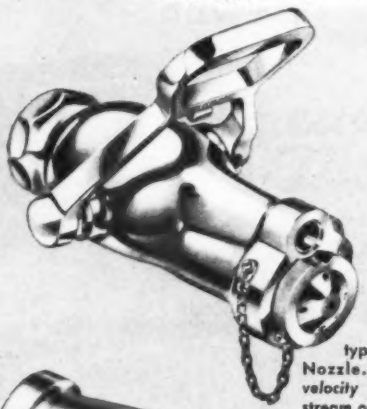
Rockwood's Family of Modern Fire Fighting Tools and Chemicals

Continues to Grow

into the most advanced line of fire fighting products that has been offered to firemen in a half century.

We are pleased to announce the appointment of the Gustin-Bacon Manufacturing Company as our exclusive distributor of Rockwood Portable Fire Protection products in the mid-continent area.

Now it is possible for you to obtain more prompt and complete engineering information as well as faster delivery on Rockwood's entire line of portable fire protection products. This can be obtained from Gustin-Bacon Manufacturing Co. of



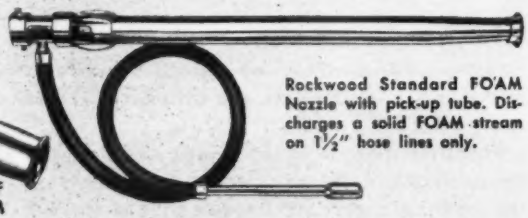
Rockwood LIGHTweight triple-action type SG-48 WaterFOG Nozzle. Discharges *high velocity* WaterFOG, straight stream or *low velocity* WaterFOG.

New LIGHTweight Type FFF Rockwood FogFOAM Nozzle. Available in three sizes for service on 1½", 2½" or 3½" hose. Discharges FogFOAM, FOAM and WaterFOG.

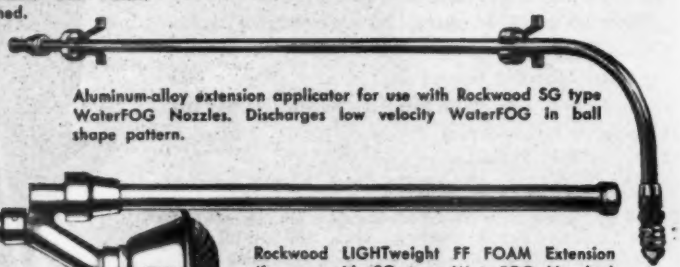
Rockwood FOAM eductor introduces FOAM Liquid into hose line for use with Rockwood type FFF FogFOAM Nozzles.

Rockwood LIGHTweight Type B, 500 GPM, High Capacity WaterFOG Nozzle for use on deluge guns, ladder pipes, etc.

Rockwood LIGHTweight type FFF FogFOAM Nozzle with FOAM shaper attached.

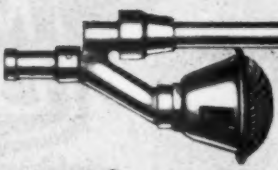


Rockwood Standard FOAM Nozzle with pick-up tube. Discharges a solid FOAM stream on 1½" hose lines only.

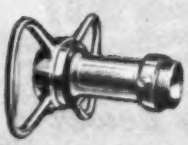


Aluminum-alloy extension applicator for use with Rockwood SG type WaterFOG Nozzles. Discharges low velocity WaterFOG in ball shape pattern.

Rockwood LIGHTweight type N-23 WaterFOG Nozzle with swivel handles.



Rockwood LIGHTweight FF FOAM Extension (for use with SG type WaterFOG Nozzles.) Rockwood FF Extension can be easily attached to a ¾" or 1" and 1½" SG type WaterFOG Nozzle. Discharges FogFOAM and Solid FOAM Stream.



Rockwood LIGHTweight swivel handle play pipe available in 1½" and 2½" sizes for all Rockwood Nozzles.

Rockwood LIGHTweight ball type shut-off for use on 1½" and 2½" fire hose lines.

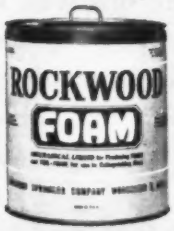
Rockwood FF FOAM Extension attached to SG Type WaterFOG Nozzle.

GUSTIN - BACON MFG. CO. will sell and service Rockwood equipment in these midwestern states

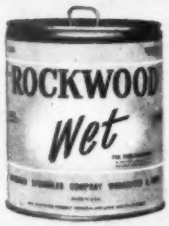
Kansas City, Missouri and its 24 dealers located at strategic points throughout the mid-continent.

Rockwood offers you the most efficient line of new fire fighting tools utilizing water and FOAM that has ever been developed. And we sincerely believe that by associating ourselves with Gustin-Bacon, we have provided the most efficient form of distribution for our products in your section.

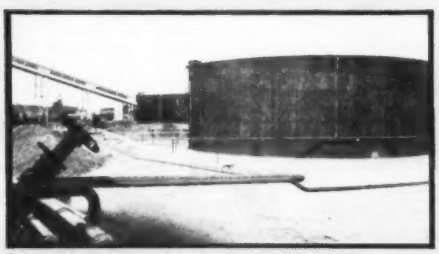
Rockwood Sprinkler Company



Rockwood FOAM. A mechanical liquid type FOAM for producting FOAM and FogFOAM for use in extinguishing fires.

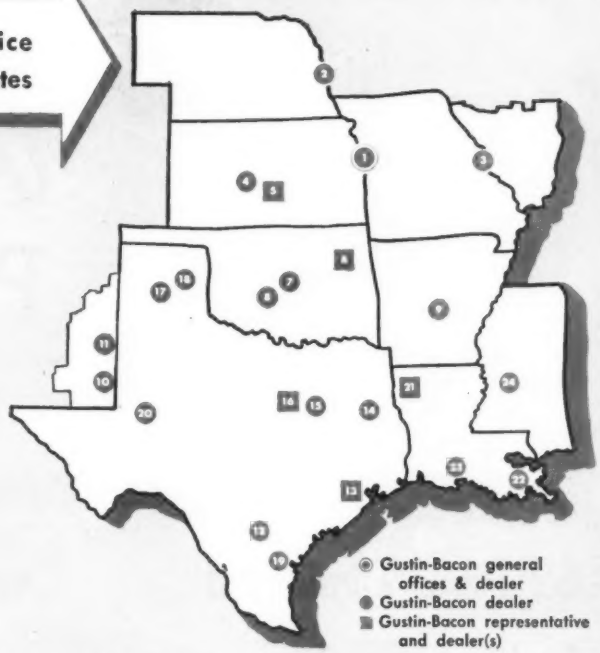


Rockwood "Wet". Wetting agent or penetrant to be mixed with water for fighting fires.



Tank farm at a large electric power generation station protected with Rockwood fixed FOAM systems. The tank in the foreground is a 150,000 barrel steel tank (150' diameter by 48' high).

For wholehearted cooperation in working out your fire-fighting problems, get in touch with your nearest Gustin-Bacon District Office — in Tulsa, Ft. Worth, Houston, Shreveport or Wichita. Complete stocks of Rockwood fire-fighting materials will be warehoused in Kansas City and Houston. The 24 Gustin-Bacon dealers shown on the map have stocks of foam, wet, and nozzles, and they're ready, willing and able to give you service on Ansul, as well as Rockwood equipment.



1. Kansas City, Mo: G-B General Offices
   Safety, Inc.
2. Omaha, Nebraska: Cardinal Supply & Mfg. Co.
3. St. Louis, Mo: Safety, Inc.
4. Great Bend, Kansas: C. W. Cotton Supply Co.
5. Wichita, Kansas: Mid-Continent Transmission & Supply Co.
   G-B Representative
6. Tulsa, Oklahoma: Eustice Equipment Co.
   W. L. Walker Co.
   G-B Representative
7. Oklahoma City: Fire Appliance & Supply Co.
8. Chickasha, Okla: Chickasha Gin Supply Co.
9. Little Rock, Ark: Fire Appliance & Supply Co.
10. Hobbs, New Mexico: Union Supply Co.
11. Artesia, New Mexico: Union Supply Co.
12. San Antonio, Tex: Alamo Extinguisher Co.
13. Houston, Tex: Allied Safety Equipment, Inc.
    G-B Representative
14. Longview, Tex: Baxter Sales Co.
15. Dallas, Tex: Fire Equipment Service Co.
16. Ft. Worth, Tex: Fire Extinguisher Service Co.
    G-B Representative
17. Amarillo, Tex: Radcliff Supply Co.
18. Pampa, Tex: Radcliff Supply Co.
19. Corpus Christi, Tex: Southwest Equipment Co.
20. Odessa, Tex: Vaughn & Co.
21. Shreveport, La: McGriff Sales Co.
    G-B Representative
22. New Orleans, La: Delta Fire & Safety Equipment Co.
23. Lafayette, La: Delta Fire & Safety Equipment Co.
24. Jackson, Miss: Safety Engineering Service Co.

GUSTIN - BACON MANUFACTURING CO.

KANSAS CITY, MISSOURI

NEW YORK · PHILADEPHIA · CHICAGO · FORT WORTH · TULSA · HOUSTON · SAN FRANCISCO

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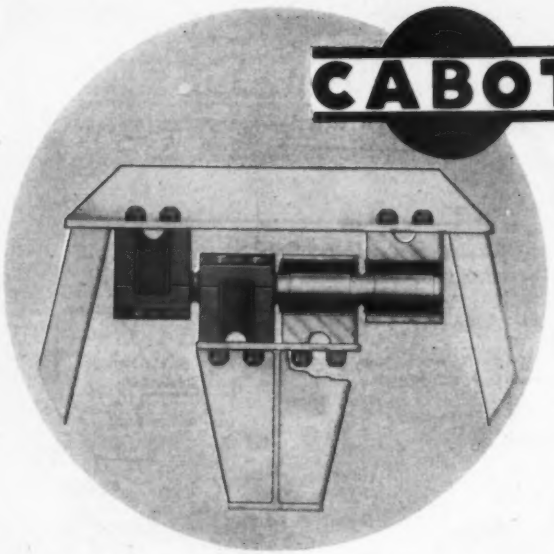


CABOT Equalastic Bearing will increase Production Profit

62 Parts Eliminated

Cushions Shock

Requires No Maintenance

Absorbs Vibration

The simpler you make them, the better they work. By applying this well known fact to the pumping unit evener bearing, Cabot has been able to do away with 62 parts. Acid and salt resistant rubber now replaces expensive, hard-to-maintain bearings.

These changes mean increased production profit for you thru reduced operating and maintenance expenses. Before you put another well on the pump, get all the facts on the Cabot Equalastic Bearing. Either contact your local Jones & Laughlin Supply store or write to us in Tulsa. You'll be mighty glad you did—once you get the complete Cabot story.

"... here's MY warehouse!"

Jones & Laughlin Supply Company

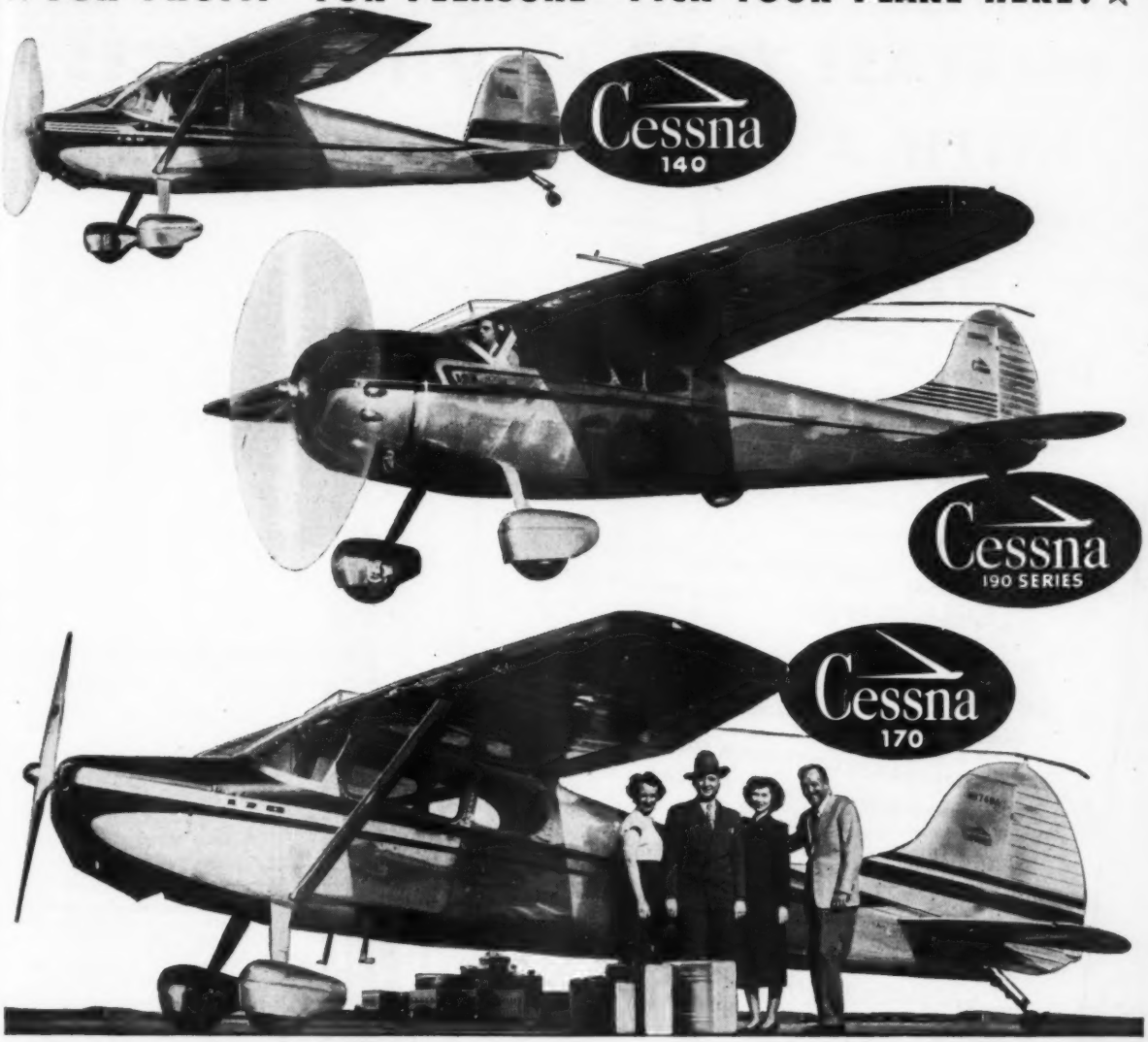
Subsidiary of
Jones & Laughlin
Steel Corporation

J&L STEEL

TULSA, OKLAHOMA

EXPORT: 405 LEXINGTON AVE., NEW YORK, N.Y. U.S.A.

☆ FOR PROFIT—FOR PLEASURE—PICK YOUR PLANE HERE! ☆



CESSNA-140—CROSS-COUNTRY COMFORT FOR TWO . . . with plenty of room for luggage . . . is yours in the all-metal Cessna 140. Quiet, fast, economical. Easy to fly. You can go where you want when you want...quickly, economically!

CESSNA-170—LUXURY FOR FOUR is what you buy in Cessna's famous "Family Car of the Air" . . . the 170! It's the lowest-priced, 4-place all-metal plane on the market . . . BY SEVERAL THOUSAND DOLLARS. A sensational value!

CESSNA 190 Series—EVERYTHING FOR FIVE! Airline-type engines, airline comfort, shorter take-off, more range, more load, more speed . . . all this plus economical operation is yours in the all-metal CESSNA 190!

COULD YOU USE 400 EXTRA EXECUTIVE MAN-HOURS—without adding to your staff?

Yes, we're offering you 10 extra 40-hour weeks of executive time—during the next twelve months. For that's the amount of travel time even the 2-place Cessna 140 saves on 50,000 air-route miles (57,250 highway miles) of company travel! And a Cessna 170 or 190 will save even more! See your Cessna dealer today and arrange for a practical test of what these planes will do for *you* in *your* business...over the routes you and your men travel. You'll be amazed at how little it costs to own and operate an all-metal Cessna—how much speed, comfort and safety they offer. Only Cessna builds a complete line of all-metal personal planes. There's one which fits your business . . . will save time and money for you.

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Please send free literature giving complete description of the Cessna 140 ( ), Cessna 170 ( ), Cessna 190 series ( ); Literature for model builders ( ).

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INCREASE YOUR PROFIT CHANCES WITH A TRIPLE-DUTY SPUDDER

BUCYRUS-ERIE spudders are triple-duty machines, with proved ability to bring in profits on top-to-bottom drilling, workover, and well-completion jobs. Here are a few important reasons why:

HARD HITTING drilling action that sinks hole fast, even in hard or badly creviced formations — and with no loss-of-circulation worries.

FAST HOISTING speeds under accurate friction-clutch control for quick handling of tubing and rods as well as other servicing jobs.

BIG CAPACITIES for derricks and machinery for safe handling of big casing loads, heavy tool strings.

SKID, SEMI-TRAILER OR TANDEM MOUNTINGS for fast over-the-road moves between locations.

TELESCOPING DERRICKS, raised and lowered under power, for quick rigging up and tearing down.

These and other features have made Bucyrus-Erie spudders favorites among cable-tool men everywhere. These modern mobile units can improve *your* profit chances, too — get complete facts from your Bucyrus-Erie spudder distributor.

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SOUTH MILWAUKEE BUCYRUS ERIE WISCONSIN

DRILL SALES DIVISION OFFICES IN DALLAS, TEX., ENGLEWOOD, N. J., EVANSVILLE, IND.

This 36-L spudder is drilling in the Lion Mountain field near Ojai, Calif.

See or write your BUCYRUS-ERIE SPUDDER DISTRIBUTOR

BEACON SUPPLY CO., Borger and Pampa, Texas • BECKWITH MACHINERY CO., Bradford, Pa. • BUCKEYE SUPPLY CO., El Dorado, Kan.; Zanesville and Wooster, O. • DRILLERS SUPPLY CO., Joplin, Mo. • DRILLING & MINING EQUIPMENT CO., Los Angeles 21, Calif. • GREAT NORTHERN TOOL & SUPPLY CO., Billings, Kevin and Cut Bank, Mont.; Casper, Wyo. • HAUCO SUPPLY CO., Greensburg, Pa. • IVERSON SUPPLY CO., Oklahoma City, Tulsa, Okmulgee, Okla.; Ft. Worth, Kermit, Odessa, Texas; Artesia, N. M. • LUCEY EXPORT, LTD., Calgary and Edmonton, Alta. • THE McJUNKIN SUPPLY CO., Charleston, W. Va.; Allen, Ky. • OLYMPIC SUPPLY CO., Seattle, Wash. • RANDALL-ZOGG SUPPLY CO., Owensboro, Ky.; Princeton, Ind. • THE STRAKER SUPPLY, Mt. Pleasant, Mich. • TILLSONBURG PIPE & SUPPLY CO., Tillsonburg, Ont.

FOUR MODELS TO MEET YOUR NEEDS: 48-L 36-L 28-L 24-L

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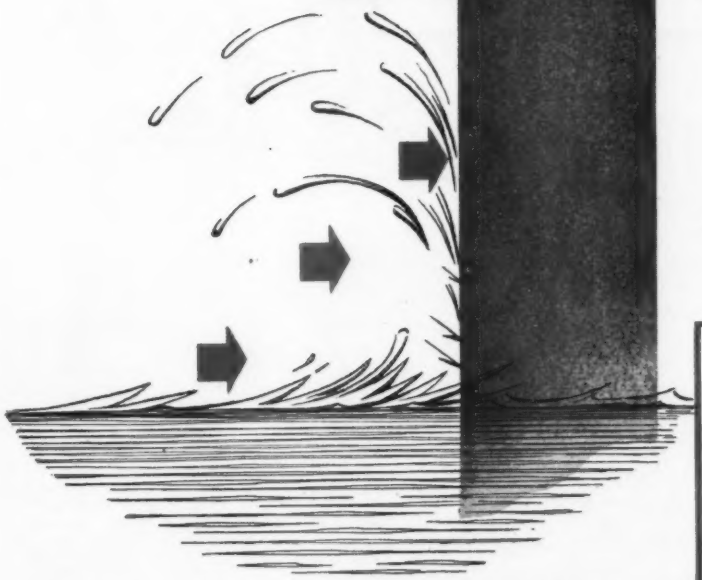
Where EROSION is a problem...

GUN IRON CASTINGS



The hardness and dense, close-grained structure of Gun Iron is ideally suited to give long resistance to erosion or corrosion. When required, this resistance can be further increased by heat treatment and/or proper alloys.

Gun Iron has been used to combat casting erosion on a number of widely varied applications. A typical example is in the case of main cylinder liners in marine diesel engines. Where the coolant water is drawn directly from the sea, the chemical impurities cavitate the liners to the point where they are useless long before they are worn out. Gun Iron liners satisfactorily withstand this erosion and at the same time give longer wear on the cylinder wall. The savings in maintenance and replacement costs reported by users are tremendous.

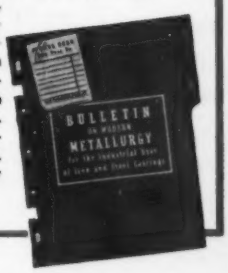
Gun Iron also provides exceptional resistance to prolonged heats, impact and pressure. The proof of Gun Iron's superiority when used for parts subjected to these problems has been dramatically illustrated thousands of times in the last 139 years. To help determine the specific value of Gun Iron for *your* strategic cast parts, our engineers and complete laboratory facilities are at your disposal. Our furnaces, foundry and extensive machining facilities stand ready to produce them accurately and economically.

GUN IRON *in the* PETROLEUM INDUSTRY

Hunt-Spiller casts and machines many parts for the petroleum industry. A few are listed below:

LINERS, PISTONS AND RINGS FOR HOT OIL PUMPS • BUBBLE CAPS AND TRAYS • TUBE SUPPORTS • PRESSURE CASTINGS

Chances are that there are many other places where Gun Iron can solve a design or operating problem. To help you determine the value of Gun Iron for your cast parts, our metallurgical department has prepared a comprehensive bulletin which contains complete properties and discussions of Gun Iron and many other metals. Engineers claim it an invaluable reference aid. Send for your free copy today.



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Norsworthy Terminal, Warren Petroleum Co., Houston, Texas.

In Materials, Design, And Manufacture, Consolidated Safety Relief Valves Combine Simplicity of Operation With Absolute Safety.

Only Consolidated Safety Relief Valves offer you the important—and exclusive—extra safeguard of *built in fixed capacity*. These valves are not dependent upon the position of ring or rings! They cannot be altered accidentally during maintenance. One adjustment controls blowdown. Lift or secondary annular orifice area is not disturbed.

Outside bevel seat and floating guide construction eliminate leakage under discharge piping stresses and maximum tightness is assured for all conditions of operation.

With 25% fewer parts than ordinary safety relief valves, Consolidated's simplicity of design reduces maintenance and minimizes standardization problems.

Be sure of continued performance at rated capacity. Specify Consolidated Safety Relief Valves.

See your local distributor for complete information.

CONSOLIDATED SAFETY RELIEF VALVES

A Product of

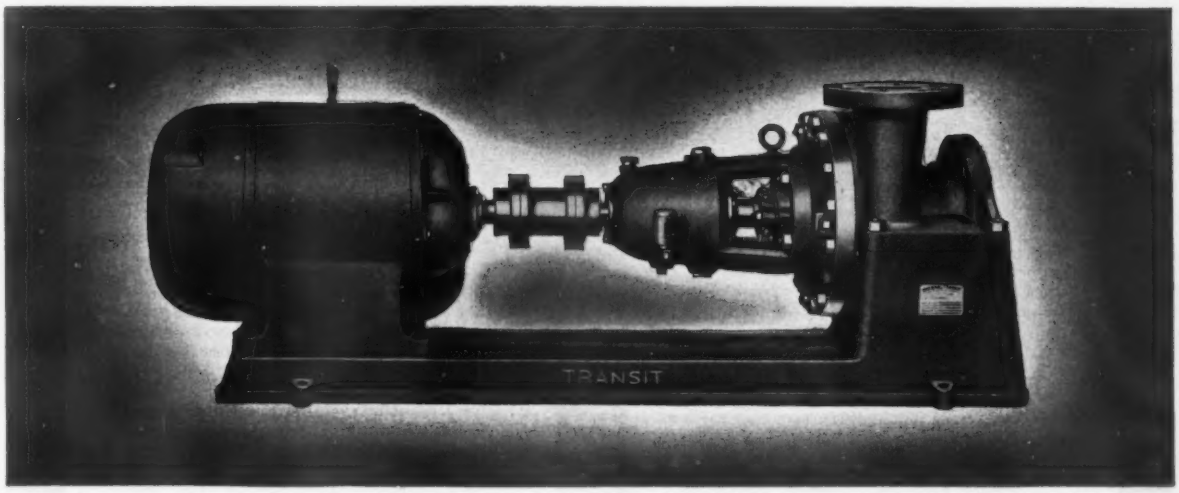
MANNING, MAXWELL & MOORE, INC.
TULSA, OKLAHOMA

Makers of 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments, 'Hancock' Valves, 'Ashcroft' Gauges. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists, and other lifting specialties.

TRANSIT TYPE *ES* PROCESS CENTRIFUGALS

New 3 YEARS AGO - *Leading* TO-DAY

In toughest Refinery Services up to 900°F and 500 psi suction pressures.
82% of the original buyers have now placed additional orders.



Because they feature:

Lowest NPSH required with Impeller eye areas 15% larger and streamlined eye entrance.
Extra corrosion allowance and **smoother operation** with 3/16" greater case thickness.
Flatter performance curve for maximum operating efficiency over the capacity range.
Broadest range of head and capacity with the **highest interchangeability of parts.**
Latest developments in Mechanical Seal Design for higher dependability and simplicity.
Smoother running due to streamlining of impeller and volute and heavier bearing bracket.
Lowest maintenance. Parts subject to wear can be replaced in less time than in similar pumps.
Very latest proven design features of streamlined flow and mechanics which give greater dependability, lower maintenance and efficient operation at no higher cost.

Ask for Bulletin 6000.

For lower pressures, capacities and temperatures, ask for Bulletin 6100, Transit Type CS.

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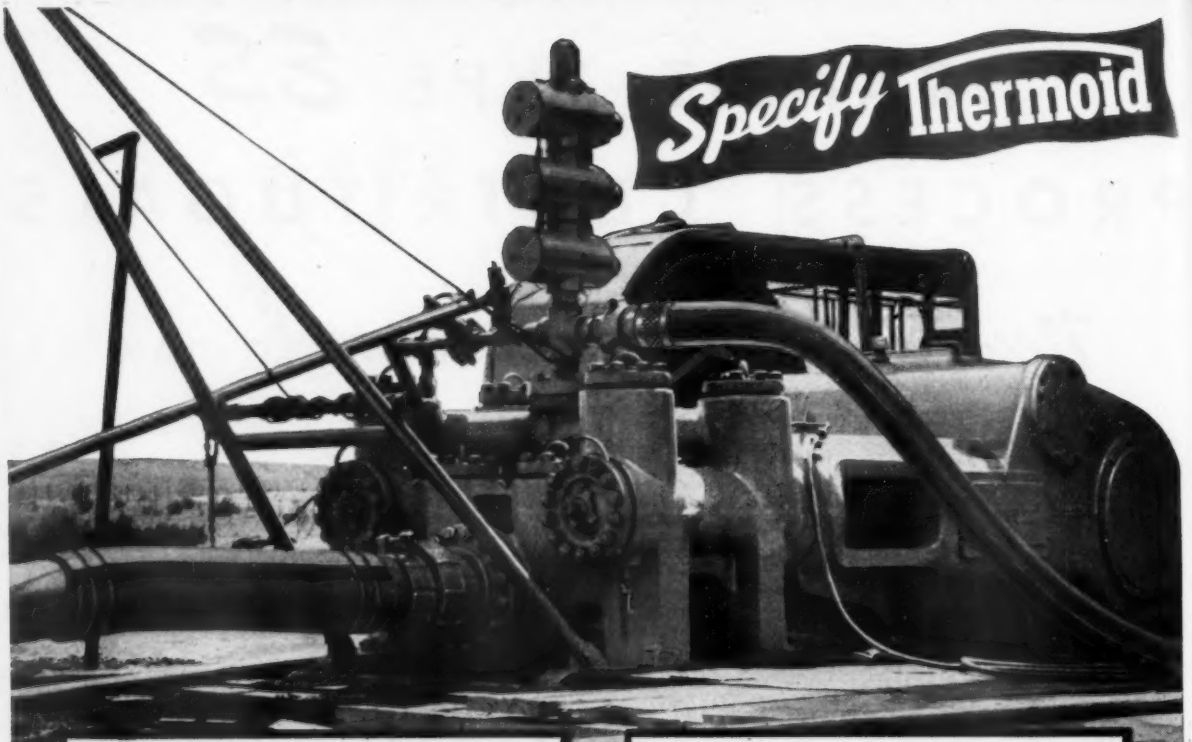

Specify Thermoid

Mud-Flo Suction Hose

Permits raising and lowering of suction pipe and changing the position of intake without changing connections.

Tube—3/16" thick, oil-resistant, bonded to strong, open-weave breaker fabric.

Reinforcement—heavy galvanized round wire embedded in compound prevents collapse . . . gives maximum flexibility . . . adsorbs vibration and permits unobstructed flow. Strong, heavy, square woven duck plies.

Cover—oil-resistant . . . withstands severe abrasion and weathering.

Furnished with built-in grooved nipples.

Flexible Discharge Hose

Speeds rig-up and tear-down time between mud-pump and standpipe. Eliminates vibration that causes loosened connections and avoids sharp angles that cause pressure loss and turbulence.

Tube—Synthetic rubber . . . abrasion and oil resistant . . . free circulation and long life assured.

Reinforcement—Steel Cables and pre-stretched fabric for the greatest strength and flexibility.

Cover—Special vulcanized compound resists aging and abrasion.

Couplings—Streamlined steel . . . full flow built-in and anchored securely for the life of the hose.

It will pay you to *Specify* **Thermoid!**

Also First Choice Thermoid Powerflex Rotary Hose

The recognized leader in the field. Every length pre-tested to 5000 psi before shipment.

Thermoid Quality Oil Field Products: Oil Country Flat Beltings • Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Powerflex Rotary Hose • Mud-Flo Slush Pump Hose Flexible Discharge Units • Brake Blocks • F.H.P. and Multiple V-Belts.

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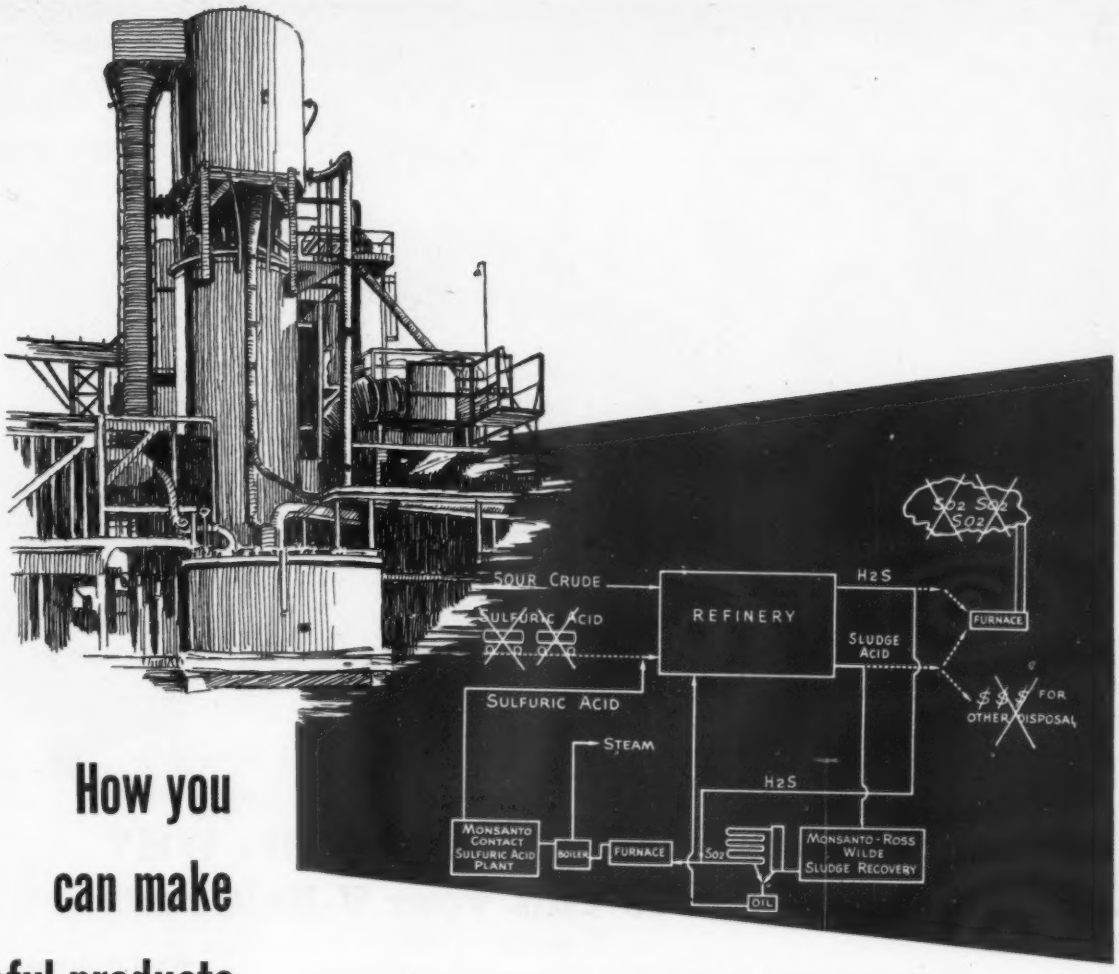

How you can make useful products from refinery sludge

You can turn *any type* of fluid refinery sludge into useful products by the installation of a Monsanto-Ross Wilde sludge recovery unit to work with your sulfuric acid plant. In addition to making money, such installation will solve your sludge and H_2S disposal problems and improve your community relations by eliminating air and stream pollution.

If you do not have a contact sulfuric acid plant, Monsanto will build one for you that will handle SO_2 from the Monsanto-Ross Wilde installation and from any H_2S you may have.

Monsanto-designed plants, equipped with automatic controls which practically eliminate manual operation, will process any type of fluid refinery sludge. The only requirement is that sludge be reasonably free-flowing. Highly viscous sludge often can be mixed with that which is more fluid to get a usable consistency.

If you have problems of sludge and H_2S disposal and want to solve them by turning such refinery wastes into money, call in a Monsanto representative to survey your problem and explain how easy and economical it is to install Monsanto-Ross Wilde plants. For prompt action, mail the coupon, write or wire MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1745-H South Second Street, St. Louis 4, Missouri. FREE BOOKLET gives details on sludge acid recovery. Mail coupon for your copy.

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CHEMICALS - PLASTICS

MONSANTO CHEMICAL COMPANY
Organic Chemicals Division
1745-H South Second Street, St. Louis 4, Missouri

Please send: .....Monsanto representative to survey our sludge acid and H_2S disposal problems;
.....Booklet on sludge acid recovery.

Name.....*Title*.....
Company.....
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City.....*Zone*.....*State*.....

SERVING INDUSTRY . . . WHICH SERVES MANKIND

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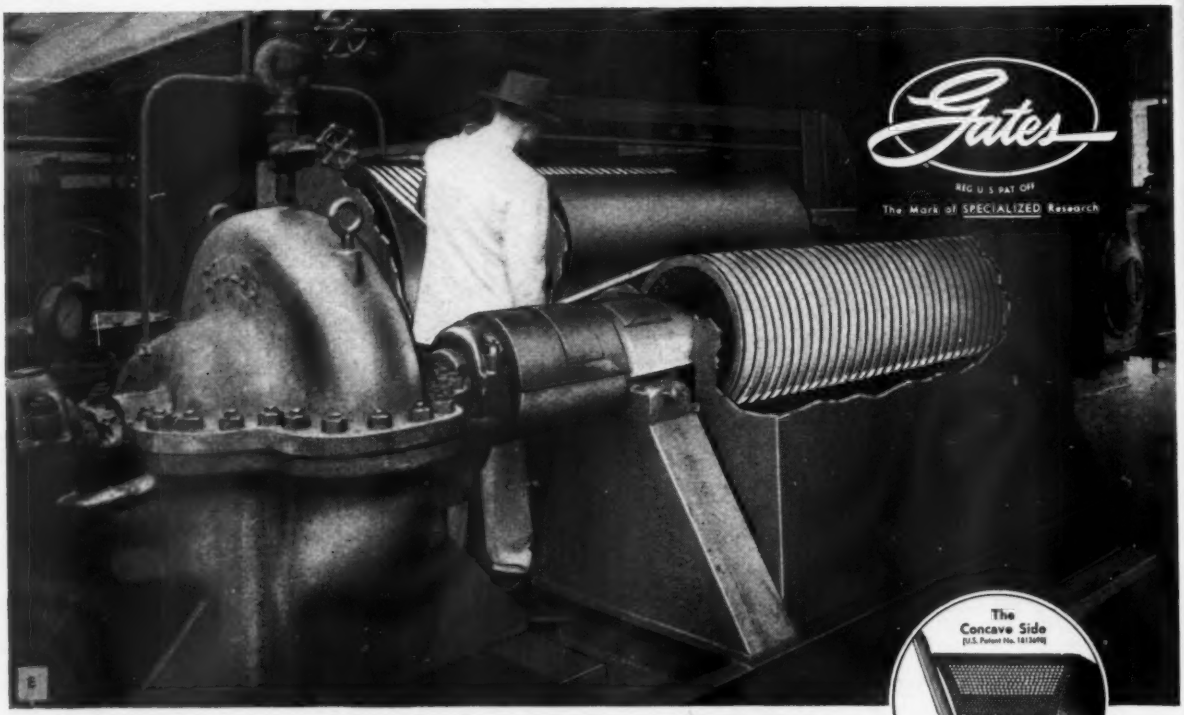


This is one of four identical Gates Vulco Rope Drives in Humble Oil's vast refinery at Baytown, Texas, each of which transmits 650 horsepower from a Diesel engine to a centrifugal pump. In designing the drives, the idler (needed for belt take-up) was so placed as to increase the wrap of the belts around the large pulley to the point where that pulley could be flat—saving the cost of a large grooved sheave.

Let this simple test tell you exactly WHY the Concave Side cuts your V-Belt costs

To see for yourself the belt-saving importance of the Concave Side, just pick up *any* V-belt and bend it as it bends when it goes around a pulley.

As the belt bends, grip its *sides* firmly with your fingers. You will feel the sides of the belt *change shape*. This is because the top of the belt is under tension and, hence, grows *narrower* while the body, under compression, *bulges out*. (See figure 1 and 1-A)

Now look at figures 2 and 2-A. There you see how the bending changes the shape of the belt that is built with the Concave Side—The Gates Vulco Rope. The concave sides of this belt merely *fill out* and become perfectly *straight*. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove*.

A very distinct saving in belt wear results. No side-bulge means that the sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in longer life for the sidewall and, naturally, *longer life for the belt!*

If you care about cutting your belt costs, it will pay you to make sure, whenever you buy V-Belts, that you get the V-Belt with the Concave Sides...the Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown by Arrows.

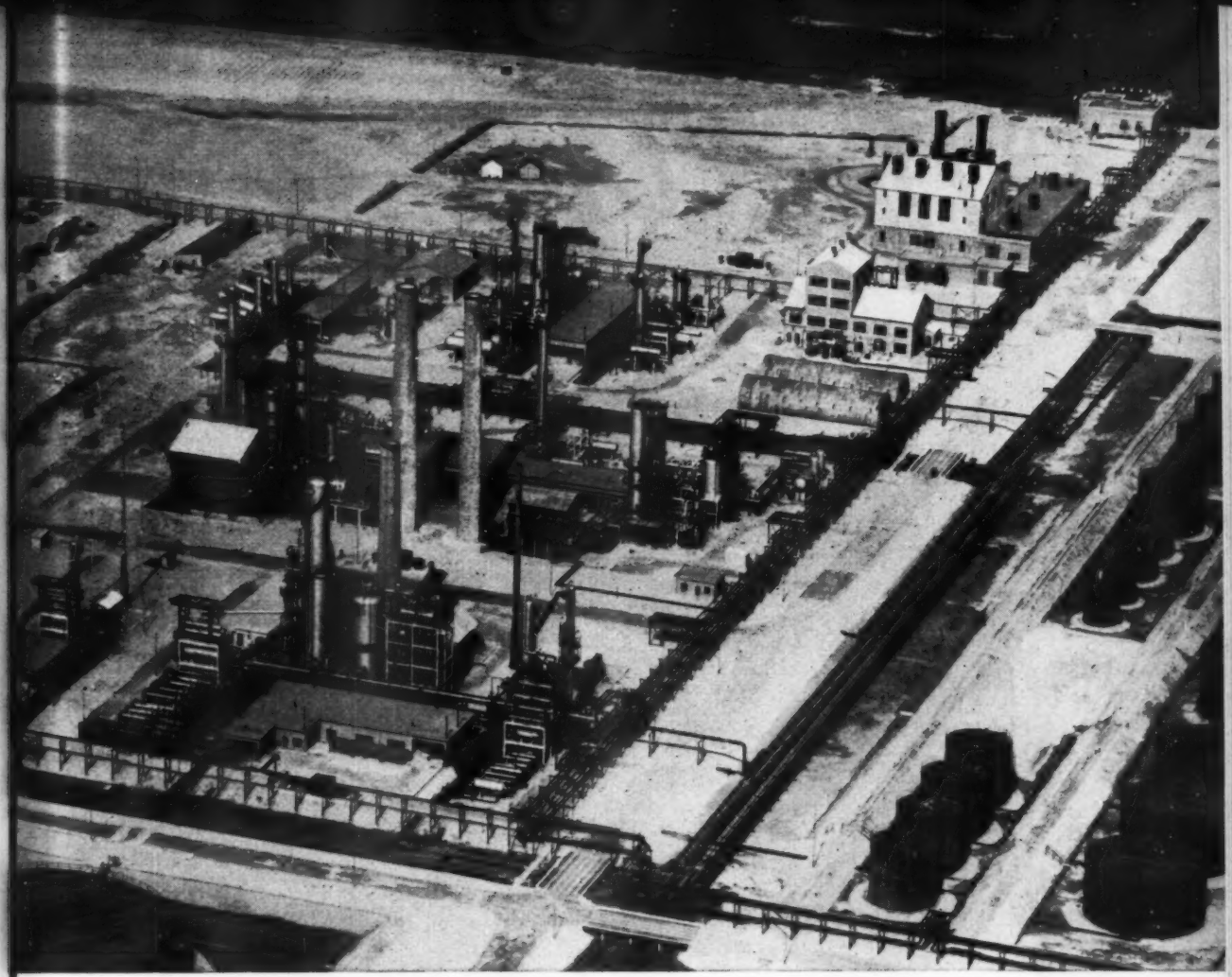
Gates Vulco Rope with Concave Side

The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-508

THE GATES RUBBER COMPANY
DENVER, U.S.A.
World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U.S. and 71 Foreign Countries



NEW 20,000 BARREL CALTEX HOLLAND REFINERY

Engineered and Constructed by

ARTHUR G. McKEE & COMPANY

This complete refinery, one of the most modern in Europe, is a typical example of the world-wide design, engineering and construction services provided by the McKee organization.

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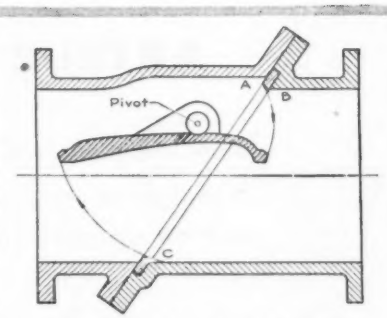
For Quick, Quiet Closing...

USE CHAPMAN *Tilting Disc* CHECK VALVES

You get truly cushioned closing with these tilting-disc check valves. There's no slamming. Instead, the disc rides smoothly on the flow, opens easily, closes quickly and quietly. Because of this effortless action, power costs are lower (when used on pump discharge lines) . . . maintenance costs are lower . . . operating expenses are saved in a dozen ways.

Available in either iron or steel. Write for bulletin with complete information.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASS.



Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

LE GRAND Pumping units

Gear Boxes, Double Helical, Double Reduction, built to A.P.I. Specification.

LE GRAND'S units range from 3,000 lbs., Polished Rod Load with intermediate sizes up to 31,000 P.R.L.

LE GRAND'S manufacture in England under licence the products of OIL CENTER TOOL CO., Houston, Texas, U.S.A.

LE GRAND SUTCLIFF & GELL LTD

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. . . and your geophysical survey findings are only as reliable as the crews that do the work in the field. For scientifically accurate results, contract with Independent Exploration Company . . . with 17 years of world-wide experience.

POINTING THE WAY IXC FOR THE DRILL

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Geophysical Surveys
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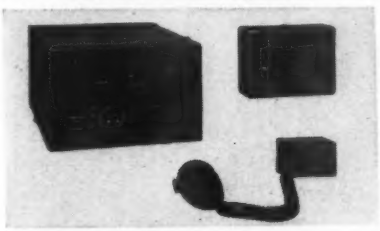
After unbiased comparative tests –

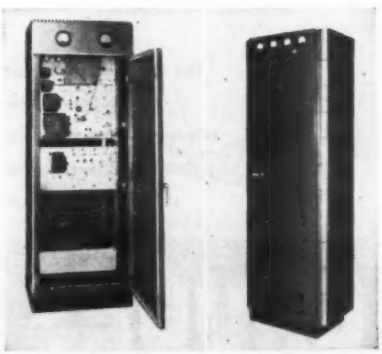
the STATE of FLORIDA *goes RCA!*

Florida uses the complete RCA Fleetfone System



• Mobile Fleetfone 30 watts

• Station Control



• Station Fleetfone 70 watts

• Station Fleetfone 250 watts

RCA 2-way Fleetfone radio chosen after tests by the University of Florida Laboratories

WHEN THE Florida State Highway Patrol prepared to expand its 2-way radio system to cover the entire state, competitive bids were invited and manufacturers were asked to submit equipment for tests.

The University of Florida Laboratories submitted these equipments to a series of gruelling tests to determine reliable car-to-car communication distance, adjacent-channel interference, and maximum headquarters-to-mobile range.

Result: Florida has ordered RCA Fleetfone 100%!

. . .

Plan your communications system around *laboratory-approved* equipment. Go RCA. The RCA Fleetfone (for 30 to 50 mc operation) and its companion, the RCA Carfone (for 152 to 174 mc operation) offer the finest in mobile communications.

For information and help on any type of two-way radio system, call or write Dept. 122H, RCA Engineering Products, Camden, N. J.

MOBILE COMMUNICATIONS SECTION
RADIO CORPORATION of AMERICA
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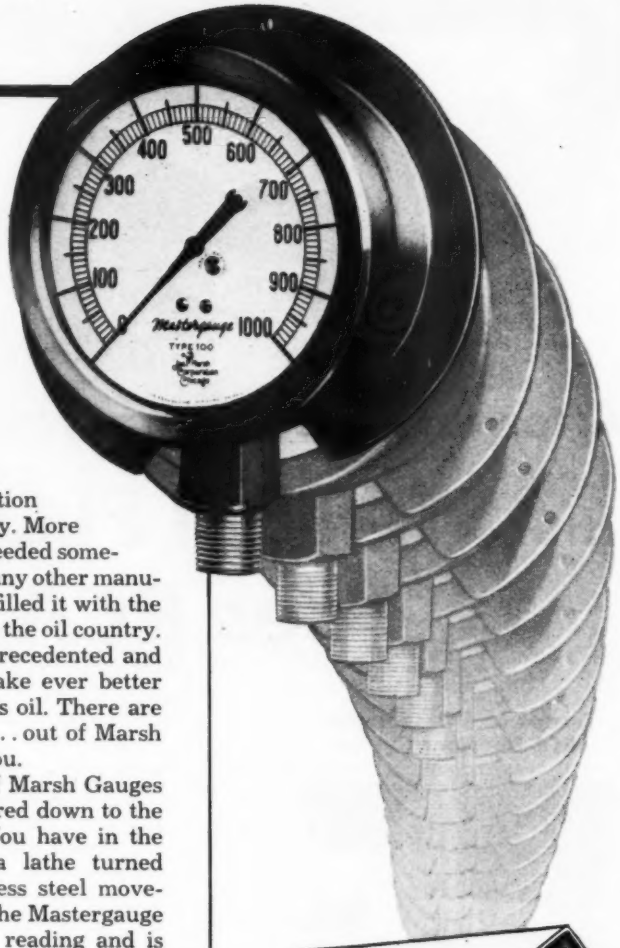
No Restrictions in this flow—



• There is no "happenstance" about the position Marsh Gauges occupy today in the oil industry. More than any other industry, the petroleum field needed something better in pressure gauges . . . more than any other manufacturer, Marsh interpreted this need and fulfilled it with the Mastergauge and other Marsh instruments for the oil country.

The recognition of this, expressed in unprecedented and ever growing demand, has enabled us to make ever better gauges and distribute them wherever there is oil. There are no restrictions in the flow of Marsh Gauges . . . out of Marsh plants . . . through your supply store . . . to you.

Your local supply house has a full line of Marsh Gauges for the oil industry—gauges that are engineered down to the last detail for every service encountered. You have in the Marsh Mastergauge an instrument with a lathe turned bourdon tube, a precision monel and stainless steel movement, a moistureproof and vaporproof case. The Mastergauge is guaranteed accurate within ½ of 1% of reading and is available in types for every application—as a Christmas tree gauge, an oil country boiler gauge, and, with protecting diaphragm, as a mud pump gauge. Also included in the Marsh line are the finest of hydraulic and Reid Vapor Test gauges.

Ask your supply store for the new Marsh bulletin, "Gauges for the Oil Industry" or write us for your copy.

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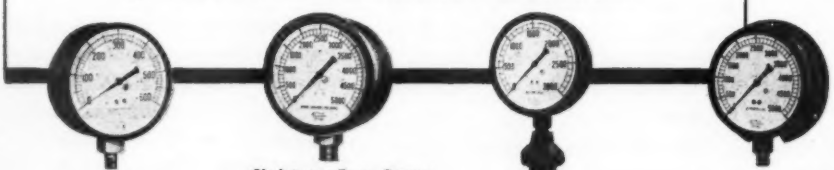
Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas



Oil Country Boiler Gauge—The Mastergauge specially made for oil country boilers.

Christmas Tree Gauge—Specially made for Christmas trees. These gauges incorporate ruggedness and accuracy beyond all others.

Mud Pump Gauge—The Mastergauge with protecting diaphragm of advanced design.

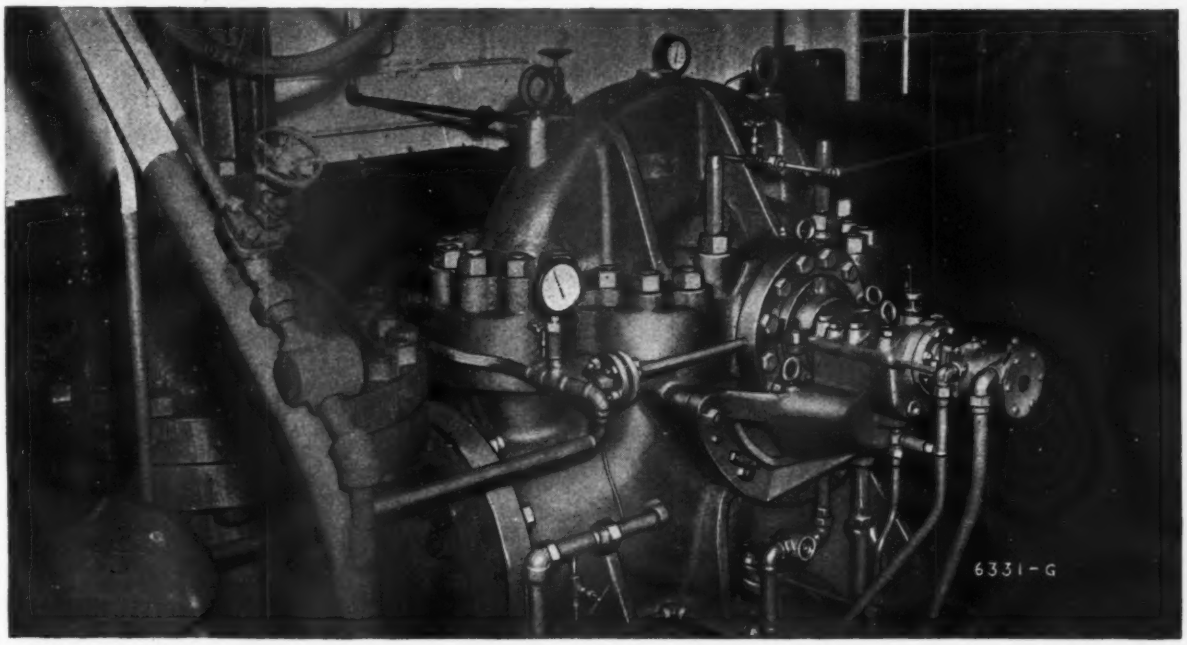
Hydraulic Gauge—Finest of hydraulic gauges in pressure ranges up to 30,000 lbs. per square inch.

The Marsh branch plant at Houston offers shipment from stock and facilities for repairing all makes of gauges

MARSH GAUGES

PRESSURES AT 1000 PSI

NOW PRACTICAL WITH CENTRIFUGAL COMPRESSORS



One of the new De Laval high pressure centrifugal compressors now pumping gas through the Big and Little inch pipelines.

The inherent advantages of the centrifugal compressor—*output flexibility, compactness, simplicity* and *high capacity*—are no longer limited to relatively low pressure service.

The development of a highly satisfactory shaft seal, coupled with other improvements in design, enables us to furnish centrifugal compressors for operation at pressures approaching 1,000 psi. These machines have given thousands of hours of continuous, trouble-free service. No mechanical failures have been experienced, gas leakage past the shaft seal has been nil and efficiency guarantees have been met.

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TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

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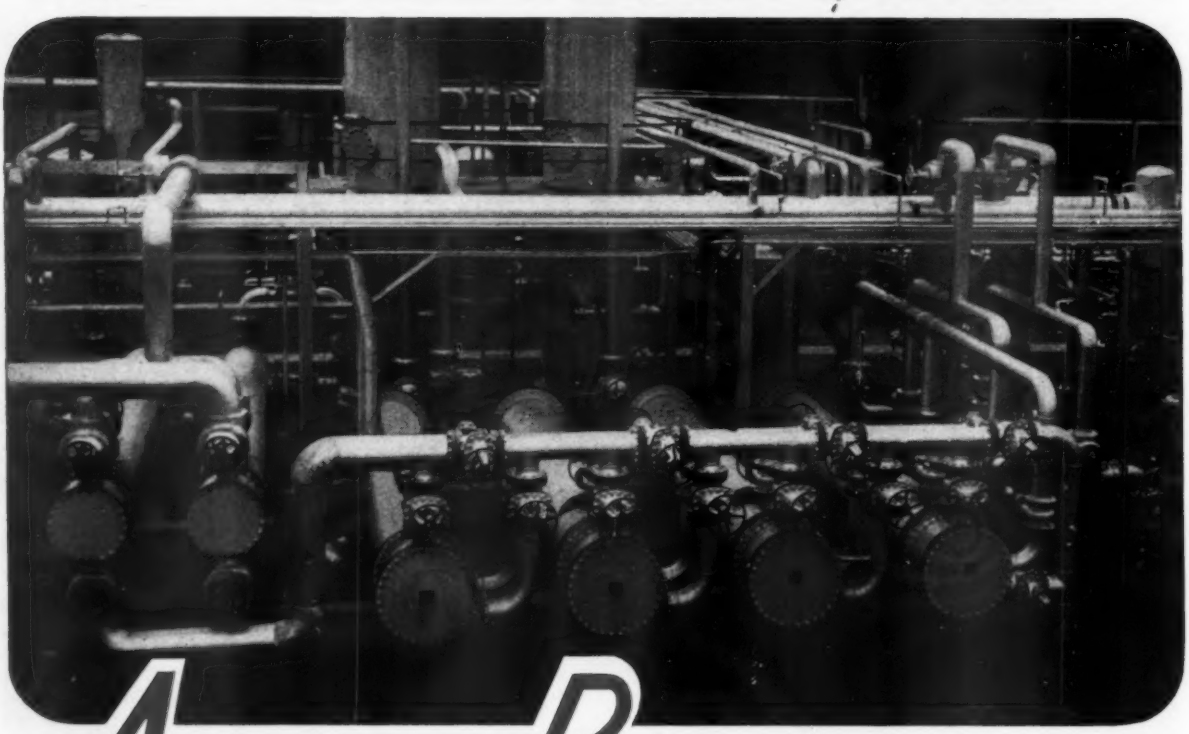
WESTERN ENGINEERED PRODUCTS . . .

for GASOLINE PLANT EFFICIENCY



AMERICAN REPUBLICS CORP.

On stream at American Republics' Silsbee, Texas gasoline plant are these Western job-tailored Multi-pass Floating Head Removable Bundle Exchangers. This bank of 32" carbon steel exchangers, each carrying 250# psi tube pressure and 100# psi shell pressure, is competently playing its important role in overall processing efficiency.

Western engineers the floating head exchangers in diameters ranging from 6" to 48" and in pressure ranges from 50# psi to 2500# psi. Exchanger jobs are tailored to rigid engineering details and specifications for the chemical processing, refining and pipe line industries. Material specifications include heat transfer equipment from carbon steel, stainless steels, aluminum or copper alloys.

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SAN FRANCISCO REPRESENTATIVE: TRIDENT ENGINEERING CO.

They Say—

Race May Develop

"The market here (Pacific Coastal area) isn't great enough for both Texas and Alberta gas. So whichever gets here first is the one that will have the market. If it's the Texas gas, there'll be no Alberta gas till a market develops.

"A pipe line will never be built for less than full demand, so there would be no chance of Alberta gas being used by the Texas pipe line."

A. Faison Dixon, in an interview at Vancouver, B. C.

Unit Agreements

"The frequent misunderstanding that unit agreements are to be imposed by law or regulation so as to deprive a minority operator or royalty owner of his equity requires affirmative correction. Every effort should be made to show the legislatures and executives of the various states, as well as the parties directly interested in the production of oil from a specific field, that a unit agreement is not a means to deprive any individual of his right to an equitable share of the produced oil. Rather a unit agreement provides an effective method whereby each party can safeguard and preserve that which belongs to him.

"Furthermore, the contention that unit operations constitute restraint of trade and, thereby, violate antitrust laws is nonsense, and can only be based upon fallacious reasoning that independent operators and landowners do not possess the right to profit to the maximum extent from the resources belonging to them, while, at the same time they serve, unquestionably, the public interest by the more prudent and effective exploitation of their property.

"It should be evident that substantial economies in development and operating cost may result from unit operations. These economies are important both to the operator and to the royalty owner for they can enable the exploitation of deep or inferior reservoirs, and they can permit a continuation of oil production down to a very low level. However, the primary advantage of unit operations result from increased ultimate recovery and this fact should not be confused with other less relevant arguments."

Paul D. Torrey, chairman of the Secondary Recovery Advisory Committee, reporting to the Interstate Oil Compact Commission.

Worry About Worry

"We are mobilizing. Whether we mobilize only partially or whether we mobilize completely we will be living in a somewhat different world. The advent of a major war or of other minor wars would accentuate the situation but would not change the basic facts.

"The emotions of our businessmen vary with the hours. They worry first about what to do about their business enterprises, and then they worry as to whether it is patriotic to worry about business at all, in such times. But, we must think and plan for Pan-Am Southern's business just the same, regardless of the times and regardless of the uncertainties. To do otherwise would be merely to cooperate with the Soviet's obvious plan to worry us to death in a war of nerves, and thus to wreck American business and the high standard of living that it supports.

"There is no doubt but that we should move ahead. The oil business is an essential business of great service to the people in peace and in war. Let's go."

Bruce K. Brown, president of Pan-Am Southern Corp., in the Panorama.

Boiled the Fat Off

Sir:

How in the world you do it, I don't know, but your short article "Propane Potential" *(The Oil and Gas*

THOMAS *Flexible* ALL METAL COUPLINGS

FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

REFINERS! PIPE LINE MEN!
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LABORATORY TECHNICIANS!

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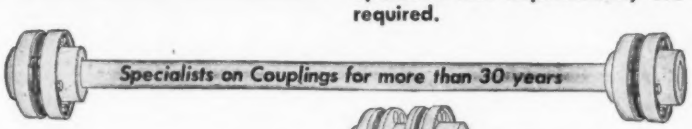

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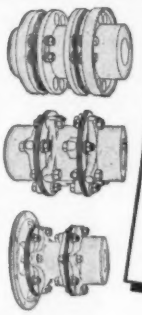

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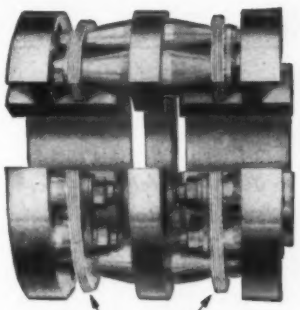

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ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

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Journal, August 10, page 41) boiled the fat off the meat and left the best short presentation I've seen on the subject.

James Flichette,
Phillips Petroleum Co.,
Bartlesville, Okla.

Meeting the Emergency

"Since the end of the last war, the petroleum industry has increased its capacity to produce, refine, and transport petroleum products by more than 25 per cent. It has spent over 8 billion dollars on additional facilities. Much of that expenditure came from plowing back a large proportion of its postwar profits. For the immediate future, oil companies can supply all military requirements and meet all civilian needs on the usual scale. There is no need of rationing, even if military demand expands substantially from present levels.

"Of course looking farther ahead, nobody can predict with certainty the levels which military needs might attain or whether far higher levels could be met in full without some limitations on the quality or quantity of civilian supplies.

"No industry made a better record in World War II than did ours in supplying both military needs and essential civilian requirements. The reason was that thousands of individual, privately managed companies were competing vigorously in service to the nation with a minimum of government control. Competition should continue, so far as possible without governmental controls, if the strength of our industry is to be fully utilized.

"If we will all cooperate in meeting the problems before us, the national emergency will be met without great disturbance of the American way of life, which we are anxious to preserve for all."

Robert E. Wilson, chairman of the board, Standard Oil Co. (Ind.), speaking on a nation-wide broadcast of the National Association of Manufacturers.

Well Prepared

"The American oil industry is better prepared today than ever before to meet any national emergency. Our domestic capacity to produce and refine petroleum has increased around 25 per cent since the peak demands of World War II.

"In the months immediately ahead, with minor dislocations to be expected, we should be able to furnish all of the military demands for oil products and supply the civilian needs for gasoline and heating oils.

"Based on the assumption that the military need for oil will increase only as greater amounts of equipment and manpower are engaged in using it, there should be no demand in the immediate future that the industry cannot readily supply.

"Although we cannot know all that is ahead, the record of our industry is reassuring. In the 5 years since the end of World War II, American oil companies have been rebuilding, improving, and expanding their facilities and creating a substantial reserve productive capacity.

"Compared to the peak war year of 1945, total United States crude-oil production capacity has been increased 27 per cent, refining capacity has been increased 21 per cent, and proven crude-oil reserves have been increased 24 per cent.

"In these 5 years American oil companies plowed back into their business more than 8 billion dollars for exploration and development and to provide these new facilities—the great bulk of this from operating profits.

"The key to the strength of the American oil industry is the driving force of competition. This strength must be preserved if the United States is to remain a power for peace. Even with national planning and restrictions, the nation must continue to rely on private management, and although close and full cooperation with governmental agencies is necessary in times of emergency, nothing should be done that will impair the incentive for competition in normal times."

Frank M. Porter, president of American Petroleum Institute, in an open letter to the industry.

Eagle-Picher Lead Wool

STOPS

bottom water

Rule out the risk of oil-wasting bottom water shutdown by tamping Eagle-Picher Lead Wool in the hole. The finely stranded, flexible metallic wool makes a water-tight plug that seals every crack and crevice. Comes in convenient 50-pound sacks—easy to place in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.

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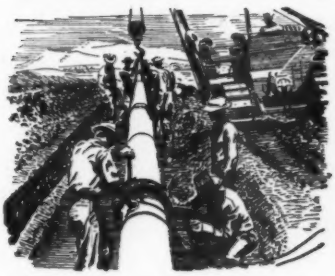
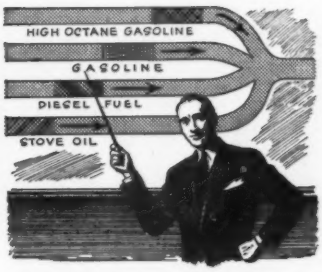
Standard develops peacetime use for atomic energy



Salt Lake Pipe Line Company (a Standard Oil Company of California subsidiary) is completing a 566-mile pipe line between Salt Lake City and Pasco, Washington. The line will serve many points with a variety of petroleum products.



How could these products be kept separated...products ranging from diesel fuel to high-octane gasoline ...as they follow each other through this common carrier line? This problem has been solved efficiently by using atomic energy.

Each time a change to a new product is made, very minute amounts of radioactive tracer material are put into the line... tracer material prepared especially for this use in the Government atomic pile at Oak Ridge, Tennessee.

Using a Geiger Counter, operators at the destination can tell exactly when the radioactive tracer arrives in the pipe...and they can switch the new stream of gasoline or oil into the proper tank. The radioactive tracer is so diluted in each batch of products that only the recording made by a Geiger Counter can tell you it's there. Its radioactivity will be far less than that of a luminous watch dial.

This is one of the first commercial uses of atomic energy in American industry. But it won't be the last.

Our scientists...and those of other companies... are fast learning how to make this great development work for peaceful purposes. You'll see the results of this knowledge soon... not only in improved methods of transportation but in new and useful products.

STANDARD OIL COMPANY OF CALIFORNIA

plans ahead to serve you better

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NORRIS DRILL ROD AND COUPLINGS

for shot hole, exploration and core drilling. Coarse pitch Acme thread makes-up and breaks-out easier. Couplings are bucked on and all joints normalized after forging. Available in 10 and 20 foot lengths. Special purpose rods and couplings can be manufactured to your specifications.

NORRIS DRILL PIPE AND COUPLINGS

offer great strength plus perfect fluid seal. NORRIS TOOL JOINTS are heat treated to exact hardness before machining. NORRIS DRILL PIPE is available with regular or internal flush tool joints, bucked on by machine under fully controlled torque and make-up.

Write for Bulletin No. 37.

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JOURNALLY Speaking

Postcard Editorial

THE oil industry, which developed its own transportation system in spite of opposition from railroads and many other interests, can ship a gallon of oil 1,000 miles or more at a cost less than that the Government charges to deliver a post card. Yet the industry makes money on its pipe lines while the Government loses money on post cards. In spite of that there are people who want the Government to own the pipe lines and, presumably, run them like the Post Office.

The above is a good start for an editorial on free enterprise versus government ownership, but if you need to have the moral pointed out to you, you wouldn't agree with the editorial, so we'll leave it at that.

Liquid Output

STATE rivalry and local pride keep cropping out in all deliberations of the Interstate Oil Compact Commission — all in a spirit of good, clean fun, of course.

But with Texas so overwhelmingly in the lead both in crude production and in bragging, the other states don't get a chance to make much of a show. So the delegates to the French Lick meeting got a chuckle out of a brag slyly tucked into the serious report from Kentucky on that state's ability to produce oil for a national emergency. While the state's output of crude oil is only 28,000 bbl. per day, the report stated, Kentucky can easily maintain its present production rate of 20,000 bbl. per day of whisky.

That's one record Texas can't match, and Oklahoma and Mississippi aren't supposed to even mention the subject.

Sell by Smell

NOW that the "little hot war" threatens to put a halt to the octane race, refiners and marketers—and ad copy writers—may have to find something else to stimulate the sale of one brand of gasoline as against other brands.

One suggestion may be found in a press release announcing that great strides are being made in the field of industrial aromatics—which means taking the stink out of things. One company, for example, says a few drops of its new potion will make sulfurous, smoky-smelling rubber products smell like mountain air after a summer shower.

This opens a new vista for gasoline marketing. With an eye particularly for lady motorists, refiners could soup up their products with all kinds of exotic scents. We suggest such slogans as "high-octane odor," and "just smell the power," and let the mad geniuses of the advertising profession take it from there.

Wives, Too

WE have already promised to continue running cartoons, but the fan mail still keeps coming. For instance, a gent in Avenal, Calif., post carded:

"Here's one strong vote from a loyal subscriber who figures that everyone with many red corpuscles likes to see cartoons—but most folks, like me, would never think to sit down and write you that they're fine."

And in the same mail another post card from the same place messaged:

"I see where my quaint husband has written you defending the cartoons published weekly in your magazine. Don't wives get to vote on this, too? I'll side with the 'old man' this time and say that you should continue them, by all means. They're about the only part of the contents I can really understand. I don't do well on gravity-drainage calculations and recycling, for example, but I can catch on with the drawings.

"(P.S. — You ought to add a joke column)."

We resent that last crack, madam. What did you think this page was supposed to be?

—Henry D. Ralph.

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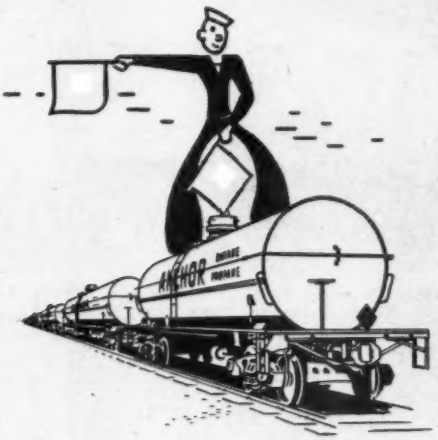
BUYING?

When buying natural gasoline or other petroleum products, Call Anchor First. Anchor will supply your needs promptly and in any quantity. You'll like doing business with Anchor—large enough to serve you, small enough to know you.



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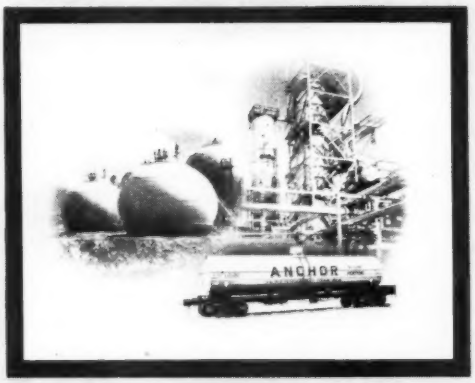

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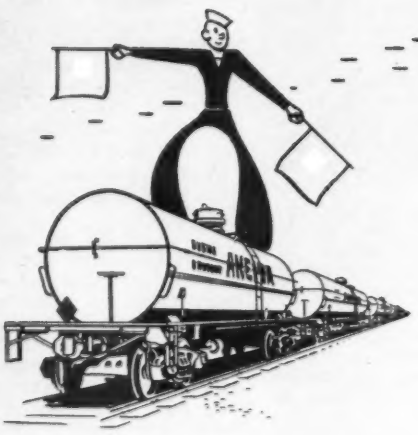

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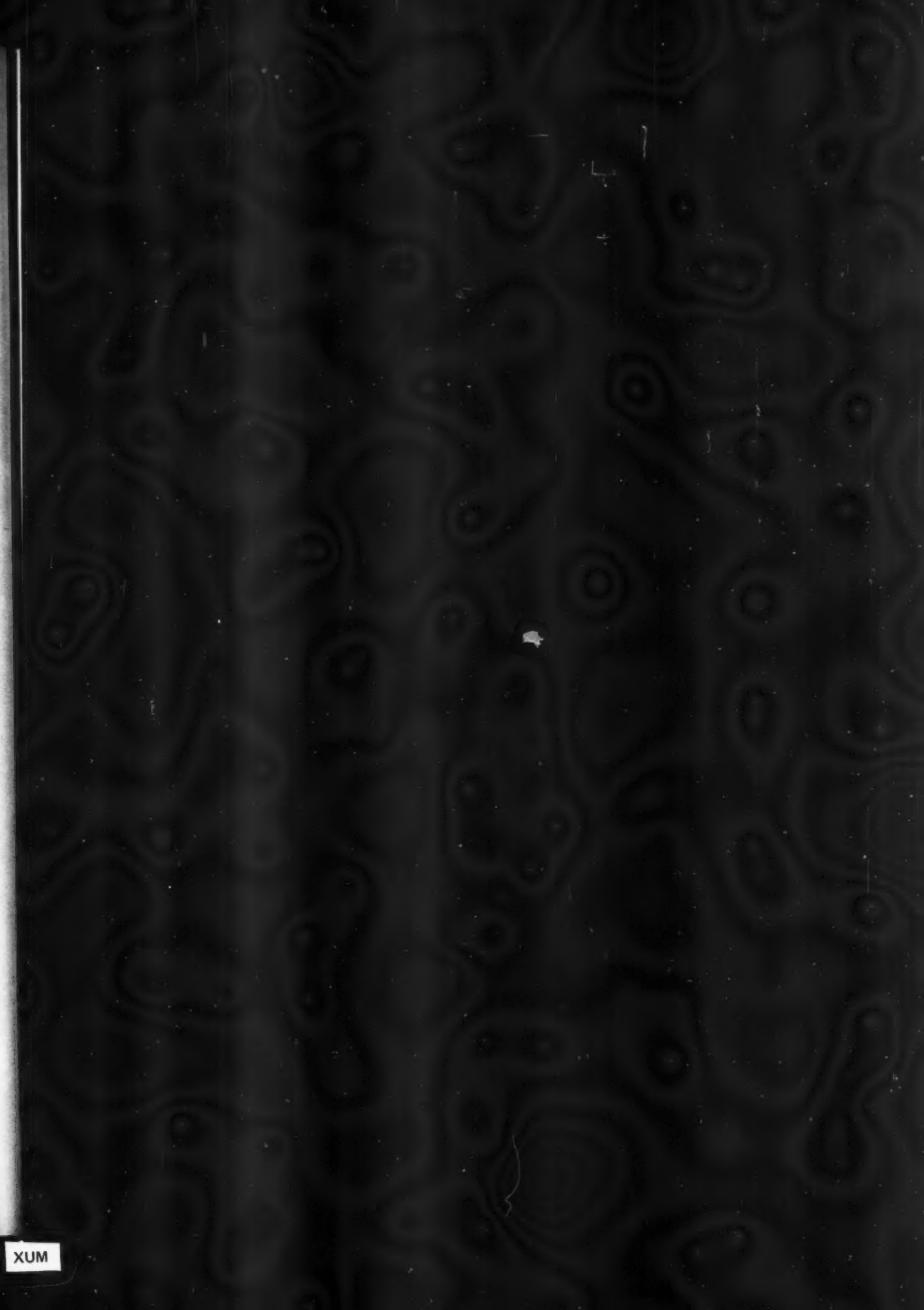
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VOL. 49, NO. 17 AUGUST 31, 1950

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BAKER CASING SCRAPING WILL SAVE YOU MONEY, AND TIME, AND TROUBLE

There now are two types of Baker Casing Scrapers which safely, efficiently and economically remove bullets, burrs, hardened cement or mud, and even mill scale from the important "working surface"—the inside wall of the casing.

The results are so satisfactory that many operators now consider the use of a Baker Casing Scraper a "must" in well completion, or after every gun-perforating job.

CHOOSE THE TYPE TO EXACTLY MEET YOUR NEEDS

While the rotary rig still is up, and only hardened cement or a limited number of gun-shot burrs are to be removed, the time-tested Baker MODEL "B" Casing Scraper (Product No. 620-B) is recommended. It is usually run just above the bit while drilling out cement, and will completely remove protruding burrs as well as the thin sheath of cement left even after the maximum gauge bit has been used for drilling out.

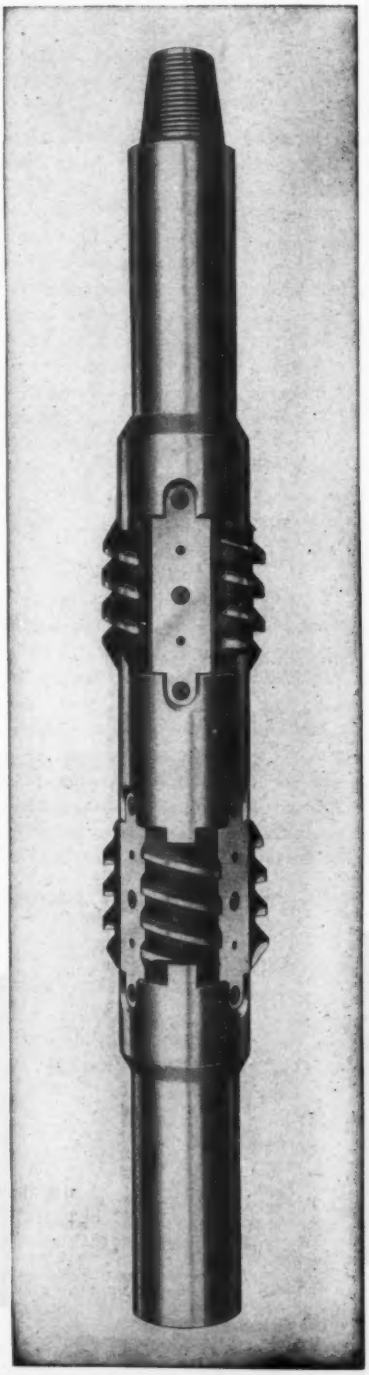
When there are several hundred gun-shot holes (with possible imbedded bullets); or if the hardened mud sheath is to be removed from top to bottom of the well, the new Baker ROTO-VERT Casing Scraper (Product No. 620-C) is recommended. The ROTO-VERT can be run on drill pipe for successful vertical scraping of obstructions as it is being lowered in the hole; followed by rotation if difficult well conditions make rotation necessary or desirable. Or it is run on tubing or a wire line for successful all-vertical scraping.

Either method leaves the inside wall of the casing "clean as a hound's tooth" safe for testing and completion, and ready also for all future down-hole work a year or ten years in the future.

NEW ROTO-VERT IS SAFE AND POSITIVE

The strong, simple construction of this efficient scraper is evident from the illustration which shows the rugged body on which six blade blocks are mounted, and held in position by blade block retainers. The blade blocks are set in two horizontal rows in a staggered position so that the blades overlap and will scrape the full 360° inside wall surface of the casing. The shearing edges are cut on a helix angle and provide a scraping, or shearing, action both while moving down the hole and while rotating. The thrust of each blade block, when rotating, is taken by a driving block which is welded to the body. Springs behind each blade block hold the heavily hard-faced cutting edges against the inner wall of the casing where they exert positive shearing action. ROTO-VERT blades will never screw down past a casing burr because their scraping edges follow the contour of a LEFT-HAND SCREW.

Contact the Baker representative in your area and find out how the reasonable rental is mighty cheap insurance for having *every* well in perfect condition for running tubing or liners, as well as any type of swab, tester, packer or cementing device.



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Casing Scraping
always pays
its way

BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK

Pioneer Spirit

A generation of empire builders like that typified by the late Frank Phillips may never again be seen by the oil or any other industry. The day is passing when one man can start with nothing and build up one of the largest oil companies in the country through his own resourcefulness.

Modern corporate practices, tax and other laws, and a prevailing distrust of individual business power have made it practically impossible to build such personal empires and proprietorships in a single lifetime.

Yet in large measure the oil industry is what it is today because of a score or two of such individual empire builders. It has been said against them that they were reckless gamblers motivated by private gain and lust for power, rugged individualists who asked no quarter and gave none. Be that as it may, it cannot be denied that in building their personal enterprises they built the oil industry.

It took daring and action, vision and optimism, strength and stubbornness to build the industry, and these men supplied them. That they made huge fortunes for themselves is incidental to the fact that they plowed the bulk of their earnings back into the venture and thus made it possible for others to prosper.

Some will regret that the day of the empire builder is past. But methods and customs change, and business, including the oil business, must be conducted in a different outward form.

What matters is the spirit. Phillips and his generation were pioneers in every sense of the word, and their pioneering spirit was transmitted to the entire industry and became its most distinguishing characteristic.

This spirit still lives in the oil industry. It has not been and need not ever be smothered by corporate forms, regulatory laws, nor stockholders' proxies. Such handicaps differ in form but not degree from the obstacles surmounted by earlier pioneers.

A corporation need not be soulless, and the present-day oil corporation is proving that it can have as much personality and individuality as the bygone proprietorship. This is because the men who manage them are still driven by the pioneering spirit of their mentors of the last generation.

When a corporation risks millions of its stockholders' funds in a wildcat venture it is pioneering. When it sinks millions in research it is keeping alive the pioneer spirit. That spirit motivates the construction of costly plants to test new processes and make new products.

If the pioneer spirit ever dies, the oil industry will die. In this business, every day is a new challenge, and challenge is the breath of life to a pioneer.

The oil industry owes much to its pioneers. But its greatest debt is the obligation to keep alive the spirit which drove these men to success, the obligation to instill in its personnel the feeling that they, too, are pioneering, albeit with modern methods, on a wide and lusty frontier.

XUM

THIS WEEK

WASHINGTON—Control and allocation bill still not law as Congress and the President haggle over its provisions. . . . But steel industry is holding up advance orders and sponsors of big oil projects are getting in line for the expected priorities. . . . ¶Question of excess-profits and other defense taxes on business may not be settled for weeks. . . . ¶Export controls are tightened to keep strategic supplies from going to the wrong places. . . .

BIG PROJECTS—Five companies join to construct 20-in. crude line from Wyoming to Wood River, connecting with many Midwest refineries. . . . Long-discussed project will provide new outlet for Rocky Mountain crude, may speed drilling in the area. . . . ¶Group of Southwest independent producers form company to build 20-in. crude line from Permian basin to California. . . .

INDUSTRY—Death of Frank Phillips marked by oil industry as passing of one of its pioneer empire builders. . . . ¶Many companies revising their employe-benefit programs to provide liberal assistance to men going into military service. . . .

TECHNOLOGY—The drag chain, time-honored badge of the gasoline truck, will disappear as science finds better ways of bonding static. . . . ¶Bureau of Mines speeds plans to test its improvements in producing synthetic liquid fuels from coal with new pilot plant at Louisiana, Mo. . . .

ECONOMICS—Shortage of residual fuel oil by winter appears possible if present trends continue. . . . Stocks are not building up and production may not keep pace with demand unless price advances or imports increase.

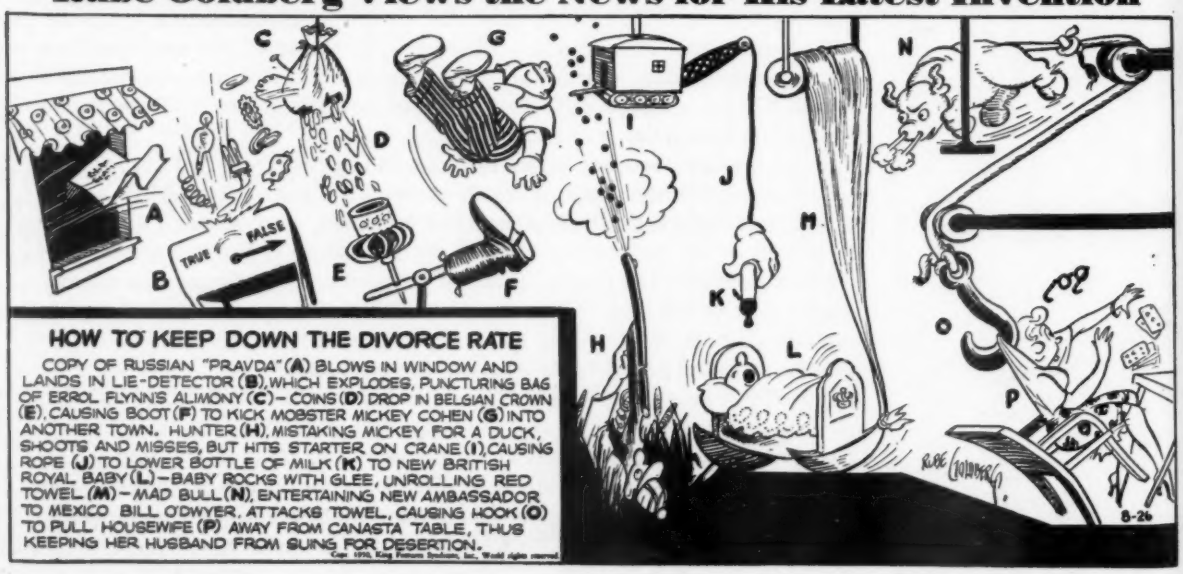
ACTIVITY—Crude-oil production averaged 5,625,675 bbl. daily for week ended August 26, up 5,150 bbl. daily from previous week and 905,200 bbl. daily from same week last year. . . . ¶Well completions for the week totaled 907, an increase of 190 wells over same week in 1949. . . . Wildcat completions were off 36 wells from previous week to 154 but still 17 wells greater than last year. . . . ¶A total of 2,227 rotary rigs were operating in United States on August 21, a gain of 7 rigs over previous week and 264 rigs over same week last year. . . .

TRENDS—Operators have completed an average of 889 wells per week for the past 8 weeks. . . . The Oil and Gas Journal forecast at midyear called for an average of 868 wells per week for the last half of the year. . . . Operators can complete their reported programs by averaging 860 wells per week for the remaining weeks of the year. . . . ¶Completions first 7 months are 2,000 above last year. . . .

INTERNATIONAL—Colombia warned by special mission of International Bank that protection of foreign investments is needed to rebuild its petroleum industry. . . . Specific projects are suggested. . . . ¶Brazil is completing small refinery for domestic crude, plans big one for imported crude. . . . ¶Pemex reports crude production first 6 months was 22 per cent higher than last year. . . . ¶Companies operating in Egypt say government feelers to attract capital are insufficient to permit operations there.

REFINING—Cities Service will modernize its old Ponca City refinery, adding cat cracker and increasing capacity. . . . ¶Government making survey of prospects for obtaining benzene from petroleum refineries. . . .

Rube Goldberg Views the News for His Latest Invention



HOW TO KEEP DOWN THE DIVORCE RATE

COPY OF RUSSIAN "PRAVDA" (A) BLOWS IN WINDOW AND LANDS IN LIE-DETECTOR (B), WHICH EXPLODES, PUNCTURING BAG OF ERROL FLYNN'S ALIMONY (C) – COINS (D) DROP IN BELGIAN CROWN (E), CAUSING BOOT (F) TO KICK MOBSTER MICKEY COHEN (G) INTO ANOTHER TOWN. HUNTER (H), MISTAKING MICKEY FOR A DUCK, SHOOTS AND MISSES, BUT HITS STARTER ON CRANE (I), CAUSING ROPE (J) TO LOWER BOTTLE OF MILK (K) TO NEW BRITISH ROYAL BABY (L) – BABY ROCKS WITH GLEE, UNROLLING RED TOWEL (M) – MAD BULL (N), ENTERTAINING NEW AMBASSADOR TO MEXICO BILL O'DWYER, ATTACKS TOWEL, CAUSING HOOK (O) TO PULL HOUSEWIFE (P) AWAY FROM CANASTA TABLE, THUS KEEPING HER HUSBAND FROM SUING FOR DESERTION.

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TECHNOLOGY.—This week the Journal introduces a new feature—Rube Goldberg's famous inventions. After 10 years of serious political cartooning which won him a Pulitzer prize, Goldberg has returned to the inimitable mechanical sketches which made his name a household byword. His new series will appear in the Journal weekly if they meet reader approval.

Big New Pipe Line

Second outlet for Rocky Mountain crude to Wood River and Midwest refineries is planned by five companies

CASPER, Wyo.—Five participating oil companies have completed plans for the construction of one of the largest crude-oil pipe-line projects to be undertaken in the industry since the end of the war.

The 1,080-mile line will extend from a point near Worland, Wyo., to the Wood River refinery area in Illinois. It will be 20-in. through most of its length and will have an initial delivery capacity of more than 70,000 bbl. daily.

Present participants in the project are British-American Oil Producing Co., Continental Oil Co., Ohio Oil Co., Pure Oil Co., and Sinclair Refining Co. The participants have formed Platte Pipe Line Co. to build and operate the line.

Many connections.—The five participants in the project are all integrated companies with important production in the Rocky Mountain area. At Wood River, the new pipe line will connect with the trunk pipe-line system of Ohio Oil which extends from Wood River to the Ohio-Pennsylvania state line. Through interconnections it will be able to serve many of the refineries of the participating companies.

The 140-mile section of the line from Worland to Casper, Wyo., will be 16-in. The remaining length, 940 miles from Casper to Wood River, will be 20-in. The new line will be so routed that practically all the pipe lines in Wyoming can be connected. Through its length it crosses and can be connected with nearly all major pipeline systems in the Middle West.

Ohio Oil Co.'s system covering the Big Horn Basin area will be connected into the new 16-in. line at Worland. The Sinclair lines from the Wertz, Lost Soldier, and Sand Draw fields and from Salt Creek field will connect with the main-line system at Casper. Rocky Mountain Pipe Line Co., an affiliate of Continental, also serves the area.

The new pipe line to Wood River will provide a second eastward outlet for Rocky Mountain crude in excess of the refining requirements of the region. The only line now moving Rocky Mountain crude east is that of Service Pipe Line Co., a subsidiary of Standard Oil Co. (Ind.), which connects with other company trunk lines south of Kansas City.

Pipe ordered.—The first shipment of pipe for the new Worland-Wood River line is expected to be made in February 1951, and construction will be completed in the fall of the same year. Estimated cost of the project is $60,000,000. It will be financed by the participating companies and by a loan arranged with Metropolitan Life Insurance Co.

Chief executives of the five participating companies met in Casper at the offices of Ohio Oil Co. this week to complete the plans for the line. Attending the meeting were: W. K. Whiteford, British-American; L. F. McCollum, Continental; J. C. Donnell, II, Ohio Oil; L. S. Wescoat, Pure; and P. C. Spencer, Sinclair. H. L. Phillips, president of Sinclair Oil & Gas Co., is president of Platte Pipe Line Co., which will build the new line.

Since the main-line station at Casper is at an elevation of slightly more than 5,000 ft., only two pump stations will be required to provide the line with a delivery capacity in excess of 70,000 bbl. The terminal point at Wood River is approximately 4,500 ft. lower than Casper. When conditions warrant, provision has been made by which additional pump stations can be installed and the line's delivery capacity increased to about 150,000 bbl. daily.

From Casper, the line will extend through the eastern part of Wyoming in a southeasterly direction through Nebraska, passing within a few miles of the newly discovered fields in the Sidney, Neb., area. It will cross the northeastern corner of Kansas, making juncture with the present Sinclair lines at a point northeast of Carrollton, Mo.

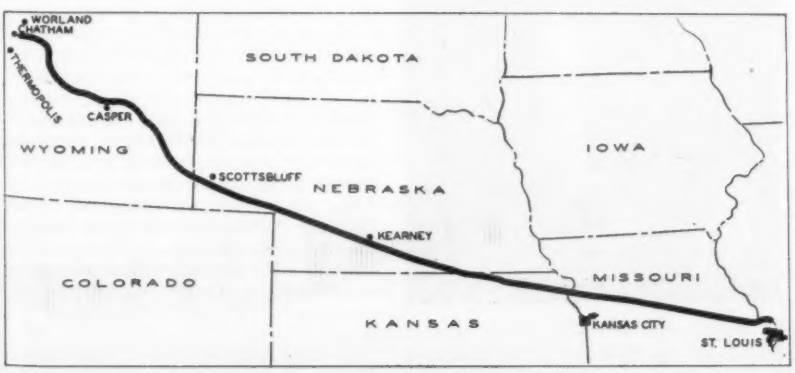
Announcement.—A joint statement of the five oil companies announcing the project said:

"Completion of this line, which will be a common carrier, will afford a greatly increased outlet for all producers in the Rocky Mountain areas seeking additional markets, and will stimulate exploration and development in the vast area which it serves. Rocky Mountain oil reserves, according to a recent engineering survey, amount to 1,690,000,000 bbl. These great reserves will now become available at low transportation cost to several of the largest refining and consuming areas in the country. Upon completion of the new line, it is estimated that there will be a market above Rocky Mountain refinery requirements for about 90,000 bbl. of oil daily.

"All of the participating companies are large operators in the Rocky Mountain area. British-American is an important producer in Wyoming and neighboring states. Continental, which is celebrating its seventy-fifth anniversary this year, was a pioneer in developing Wyoming production. Another pioneer, Ohio Oil Co., is credited with the second largest reserves in the State of Wyoming. Pure has producing operations in Worland and West Poison Spider fields. Sinclair has been active in Wyoming for 30 years and operates the state's largest refinery.

"All of the companies having Rocky Mountain refineries have declared that it will be their policy to refine in that area all that the market will absorb. The new pipe line will carry the excess of crude oil to refineries in large consuming territory.

"The Platte line fits into and supplements plans initiated since the Korean incident arose to increase available crude-oil resources by drawing upon West Texas, the Rocky Mountain area, and, if necessary, upon Canada. Need for increased outlets for Rocky Mountain crude even under normal conditions was forecast as long ago as 1947 by the Pipe Line



Map of general route of new crude line from the Rocky Mountain area.

Transportation Committee of the National Petroleum Council, which reported that the increase in consumption called for expansion of pipe-line facilities such as now planned."

Many refineries.—The refineries of the five participating companies are widely distributed throughout the country east of the Rocky Mountains with the exception of British-American, whose parent company, British American Oil Co., Ltd., operates five refineries in Canada and which presumably will make sales and exchanges of its crude moved in the new pipe line. Continental has plants at Denver, Glenrock, Wyo., Billings, Mont., Ponca City, Wichita Falls, Lake Charles, La., and two smaller units in New Mexico. Ohio has its major refinery at Robinson, Ill., and also operates a plant at Lovell, Wyo.

Pure has refineries at Midland, Mich., Newark and Toledo, Ohio, Nederland, Tex., and Cabin Creek, W. Va. The Sinclair company has a newly acquired refinery at Wood River. Its other refineries are at East Chicago, Ind., Wellsville, N. Y., Marcus Hook, Pa., Corpus Christi and Houston, and Sinclair, Wyo.

"Uncle Frank"

In the passing of Frank Phillips the oil industry loses a pioneer who led the way during its greatest growth

WHEN Frank Phillips died in an Atlantic City hospital August 23 at the age of 76, the oil industry lost one of its greatest empire builders, a man who was the living embodiment of the attributes which made the oil industry great.

His life span covered the entire growth of the oil industry in the Mid-Continent, and in that lifetime he developed a shoestring wildcat venture into the ninth-largest oil company in the United States.

Phillips Petroleum Co., which he founded and personally managed until recent years, became one of the nation's largest and most aggressive integrated oil companies chiefly because of Frank Phillips' personal characteristics.

Outstanding among these were eternal optimism and self-confidence, courage to try new ventures, interest in novel ideas, belief in scientific research, fellowship with employes, and a social conscience.

His was a "personal" company but by no means a one-man concern. In its 33 years of corporate existence, Phillips Petroleum Co. pioneered many technical developments now commonplace in the industry. This was due not to Frank Phillips' own scientific genius but to his ever-youthful curiosity and courage and his ability to instill these qualities into his entire organization.

Frank Phillips was born a pioneer and he never got over it.

He was born in a log cabin on a farm in Greeley County, Nebraska, on November 28, 1873. A grasshopper scourge drove his family to Creston, Iowa, where he attended public schools until he was 14. Then he left the farm and became a barber's apprentice. At the age of 22 he owned a six-chair shop in Creston and before long owned every barber shop in town.

Looking for more worlds to conquer, he sold out, went to work for the Creston banker, made a small fortune selling bonds, and married the banker's daughter, Jane Gibson.

The oil boom in Indian Territory caught his interest, and in 1903 he moved to Bartlesville and opened a bank which later was merged with two other banks and which he headed for many years. But the oil fever got him.

With two of his brothers, Waite and L. E. Phillips, he bought leases and nearly exhausted his resources drilling two dry holes. But the third, finished on borrowed money, was a gusher, and then he drilled 80 successful wells in succession. Phillips became one of the leading independent producers in the fabulous Osage area near Bartlesville.

In 1916 Frank Phillips sold out most of his oil holdings and intended to devote himself to the banking business. But World War I shot up the price of crude, and he came back into oil. Waite Phillips moved to Tulsa and formed his own company, and Frank and L. E. formed a partnership which was incorporated as Phillips Petroleum Co. on July 1, 1917.

FRANK PHILLIPS

From a painting by Boris B. Gordon hanging in the main office of Phillips Petroleum Co., Bartlesville.

At its organization the company had 27 employes and assets of $3,000,000. Today the company has more than 17,000 employes and assets of approximately $625,000,000, ranking it as ninth among American oil companies. Although it is now a fully integrated company, with operations in many states and foreign countries, Phillips kept its headquarters at Bartlesville, Okla., now a city of about 25,000.

To his employes, the citizens of Bartlesville, the beneficiaries of his many philanthropies, and throughout the oil industry Frank Phillips was universally known as "Uncle Frank." He liked the title, and he lived up to it.

His success and his millions never changed him. He remained a small-town boy at heart. He retained a personal interest in his employes, their problems, and their communities.

He had a knack of making his personal interests become company interests, a curious, almost feudal thing in the modern corporate age, but a thing which paid dividends for the company.

For instance, while he never learned to drive a car himself he was tremendously interested in the development of aviation. He sponsored and financed several early-day barnstorming pilots on pioneering long-distance flights which set world records. Phillips Petroleum Co. became one of the first to develop high-octane aviation gasoline.

He was interested in farming and improving agriculture by use of petroleum products. Phillips Petroleum Co. is now one of the nation's largest producers of nitrogen fertilizers from natural gas. Incidentally, his Woolaroc Ranch near Bartlesville, stocked with animals from all over the world and with one of the finest museums of Indian and frontier life in the Southwest, has become a tourist attraction which is a potent advertising medium for the company.

He was interested in youth and education. His scholarship funds for children of employes and his generous philanthropies to schools, the Boy Scouts of America, and other organizations helped build up a powerful loyalty within the company and the communities where it operated.

He was interested in sports. The "Phillips 66" basketball team became one of the nation's most famous semi-professional teams, which not only built employe morale but carried the company's trade-mark throughout the land.

He was interested in conservation. Phillips Petroleum Co. was one of the first to experiment with recovering

and utilizing wasted oil-well gas and is now one of the nation's leading marketers of liquefied petroleum gas and natural gasoline.

Most important of all, he was interested in research. Applied curiosity became a habit with Phillips Petroleum Co., and it built up one of the largest and most productive research organizations in the oil industry. It pioneered in the production of synthetic rubber, petroleum chemicals and fertilizers, and many other products and processes.

Every obstacle was a challenge to Frank Phillips. At a time when most producers were content to sell their crude to others, his company launched into the refining business. When freight rates hampered the sale of gasoline, the company built the first long-distance gasoline pipe line in the world. When the largest customer threatened to stop buying, the company, which up to that time had not engaged in retail marketing, announced overnight it would build one of the largest strings of filling stations in the country and immediately proceeded to do so.

One associate said of him: "Nothing sounds crazy to Frank Phillips if it comes from an intelligent mind. He has a genius for creating practical results out of 'unworkable' suggestions, and the more obstacles he meets the more fun he gets out of it. He's an incurable optimist."

Frank Phillips remained president of his company from its founding until April 26, 1938, when K. S. Adams, his personal choice, was elected president. The founder served as chairman of the board until March 16, 1949, when he announced that he could not keep up with the younger men and asked to be relieved of all responsibilities. He was honorary chairman of the board at the time of his death.

The general public knew Frank Phillips as a multimillionaire philanthropist. Oil men knew him as a pioneering leader who set the pace for the entire industry during the period of its greatest growth.

Tank Trucks' Tails

The dangling chain will disappear from our highways as safety engineers find better ways to eliminate static

FUTURE generations of children will not ask their daddies "what is that little tail bouncing along under the gasoline truck?" And daddy won't be able to say, as so many have in the past, "that is to keep static electricity from blowing up the truck."

The drag chain has been officially amputated by the most august body of fire-protection experts in the country.

Within the next year, as the news filters out into the counties and villages of the land, fire chiefs will appear before their city councils and, with a little embarrassment, ask that the local fire ordinance be changed to permit oil dealers to do away with the appendages on their tank trucks. And so the oil industry, which 40 years ago attached the first drag chain to a gasoline truck, will receive legal sanction to correct this early mistake.

It's official.—By voice vote and without a single protest, the National Fire Protection Association has officially deleted all mention of drag chains from the national fire codes. Thus passed the official basis for a device that for nearly 4 decades has intrigued generations of children and their elders, and has plagued an entire industry.

In proposing this action to its members, the association made this brief but significant statement: "The committee on flammable liquids now does not recommend drag chains, but specifies more positive bonding and grounding arrangements, having found that drag chains are not sufficiently reliable for the intended purposes, particularly where vehicles operate over bituminous macadam roads, very dry concrete, etc. . . ."

According to George F. Prussing, Washington consultant on fire-prevention engineering and formerly technical secretary of the Western Oil and Gas Association, the effort to do away with the legal requirement for these chains, found in almost all municipal and many state codes, commenced in 1940 when the American Petroleum Institute asked the California Institute of Technology to find out how much reliance could be placed on them.

Based on research.—During the ensuing 2 years researcher Victor Wouk, working under direction of Dr. S. S. Mackeown, measured and remeasured static charges on tank trucks as they rolled along California's sun-baked highways, took on cargoes in the oil depots, and discharged them into underground tanks at service stations. For the first time, the actual rate was measured at which the static charges are built up by tire friction on the highway, and by the flow of gasoline into and out of trucks.

The electronic ammeter, built at Caltech for these tests, and giving its answers in billionths of an ampere, was unable to detect any practical value of a drag chain as a means of preventing the accumulation of static charges on the body of the tank truck when the ground or pavement was dry.

It proved—scientifically and in more than 600 tests—what oil men had learned empirically years before, that the most reliable protection against the fire hazard from static sparks while loading or discharging a tank truck is not a drag chain but a metallic bond between the truck and the pipe from which it is filled or into which it discharges.

Bonding cable.—Such a device, known as a bonding cable, has been in use for many years wherever tank trucks are filled with volatile products. It is not used when discharging into underground tanks because the nozzle of the hose in contact with the fill opening serves the same purpose. Its efficacy has been proved by the fire-free record of thousands of trucks which handle the hundred million gallons of gasoline used by American motorists every day. However, almost every city ordinance in the land still requires drag chains, though few mention bonding cables.

After the Caltech research results were published in 1942, oil-industry engineers asked the insurance companies to join them in getting the laws changed. That has taken time—8 years to be exact. The drag chains had been on the road too long. Perhaps they served a purpose, though no one could prove it.

Finally, since no one could really challenge the validity of the Caltech research, the Fire Protection Association yielded. And now tank trucks will lose their tails.

Exports Rules Tightened

WASHINGTON.—The Department of Commerce further tightened its regulations on exports last week, reducing from $1,000 to $25 the maximum value of shipments of natural gasoline, naphtha, mineral spirits, solvents, and other finished light products permitted to be made without individual license to any countries except Canada and Mexico. It also reduced from $100 to $25 the value of such shipments of petroleum products not elsewhere specified, other than finished petroleum sprays and finished gasolines.

At the same time, the department eliminated all unlicensed shipments to communist countries, ordering that validated licenses will be required for all exports, regardless of commodity or value, to Albania, Bulgaria, China, Czechoslovakia, Estonia, the Russian zone of Germany, Hungary, Latvia,, Lithuania, Manchuria, North Korea, Poland and Danzig, Romania, and the USSR.

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Soldier Benefits

Oil companies liberalize previous war protection

MAJOR oil companies are providing more liberal plans to benefit their personnel drawn into the armed forces. Various features have been added to the programs which the companies maintained during World War II, principally the amount of cash paid at the time the employe is given military leave, and in various degrees of insurance coverage for the soldier and his family during his military term.

Shell Oil Co. has announced an expanded plan under which each employe entering military service first receives 2 months' pay in a lump sum. The company then pays to the employe's family an allowance which makes up the difference between his government base pay and his normal job earnings providing it does not exceed 50 per cent of his regular income. He is further reimbursed for National Service Life Insurance premiums to the amount of his company group life insurance; receives full retirement credit; and has half the normal company provident-fund contribution continued by the company.

Standard Oil Co. of California is giving its employes an adjustment allowance of 1 month's regular pay, and will provide a dependent's allowance representing either the difference between regular earnings and government pay and allowances, or the employe's monthly contribution to the support of dependents before military leave begins.

Pay dependents.—Socony-Vacuum Oil Co. has also extended and liberalized its previous provisions for military absence. It allows regular pay for 30 days after enlistment for all employes who have been with the company for 6 months. Thereafter the plan pays at least one-half of regular pay through the duration of military service, subject to deduction of military pay and allowances. During the first 30 days employe contribution to the annuities and insurance plan are also deducted and full coverage remains unchanged. Afterwards the company makes up the annuity contributions by both employe and company for the entire period of military service.

Standard Oil Co. (N. J.) not only makes more liberal provisions and guarantees for military personnel with dependents, but also for men without dependents. When vacations cannot be taken prior to entry into military service, the employe also receives his vacation pay. Jersey Standard has recommended similar plans to all affiliates.

Magnolia Petroleum Co. makes no distinction in benefits between volunteer and drafted men. The company guarantees that upon the employe's return to work it will make up the annuity contributions for both employe and company. Life insurance coverage is continued for the entire period of military service at no cost to the employe.

Humble Oil & Refining Co. incorporates two new benefit features to expand its former policy of benefits. It provides that group life insurance may be continued, and hospital insurance coverage for dependents may be kept in force.

Texas Crude West

Group plans Texas-to-California pipe line

WASHINGTON.—A group of independent producers have formed a company to construct a crude-oil pipe line from the Permian basin of West Texas to California, it became known here this week when representatives of the group conferred with government officials over the outlook for a supply of steel for construction.

Plans are for a 20-in line, with a rated capacity of 200,000 bbl. daily, to originate near Monahans, Tex., and terminate in the Los Angeles area. The estimated construction cost is $66,000,000. Plans also include construction of a refinery at Florence, Ariz., with a capacity of 15,000 bbl. daily, to be fed from the new line.

The new firm is known as West Coast Pipe Line Co., and its president is R. J. Bradley of Dallas, who is also president of San Juan Oil Co. Other officers are R. L. Foree, Dallas, president of the Texas Independent Producers and Royalty Owners Association, and Jack Frost, Dallas, vice presidents, and Jay Simmons, Dallas, secretary-treasurer.

The company has placed tentative orders for the pipe and estimates that the line can be built in from 4 to 6 months after the material becomes available. Government support is being sought in case formal allocation of steel becomes necessary.

Several attempts to construct a crude-oil pipe line from Texas to the West Coast were made during and after World War II, but without success.

Transport Groups Named

WASHINGTON. — Six subcommittees to study the adequacy of as many forms of petroleum transportation facilities were set up last week by P. C. Spencer, chairman of the National Petroleum Council committee to make a survey of petroleum transportation requested by Secretary of Interior Oscar L. Chapman.

The procedure for the inquiry was worked out by Spencer last week at informal meetings with the chairmen of committees which made reports on similar studies a few years ago.

Coincident with appointment of the subcommittees, Spencer announced that James E. Dyer, Sinclair Oil Corp., New York, has been named secretary of the committee.

The six subcommittees and their chairmen are: Barge and lake tanker, Harry A. Gilbert, Oil Transfer Corp., New York; natural gas, J. French Robinson, East Ohio Gas Co., Cleveland; crude and products pipe lines, W. R. Finney, Standard Oil Co. (N.J.), New York; rail, Fayette B. Dow, National Petroleum Association, Washington; tankers, James R. Patterson, Pan American Petroleum & Transport Co., New York; truck, Lee R. Cowles, Standard Oil Co. (Ind.), Chicago.

***REFERENCE ROCKS.**— Exploring for oil isn't all done in the field. In this warehouse Shell Oil Co. stores well cores and bit cuttings for examination by geologists, paleontologists, and reservoir engineers in their study of formations to form the basis of future drilling programs.*

Trouble in Resid

Current figures on supply and demand indicate that heavy fuel oil will be short next winter unless trends change

John C. Casper

A SHORTAGE of residual fuel oil may develop next winter unless present trends are changed, it is indicated by a look at the midsummer figures on supply and demand.

Demand for residual fuel this summer is running higher than in any year since the war. Despite record-breaking refinery runs during the summer months, residual stocks have increased less than 3,000,000 bbl. since the end of April. Potential demands this winter cannot be met unless residual yields at refineries are raised or imports increased.

Total demand for residual fuel in the 3-week period ended August 19 averaged a little better than 1,400,000 bbl. daily or about 240,000 bbl. daily greater than the average for August 1949. In the postwar period the smallest gain in demand from summer to the following winter has been better than 300,000 bbl. daily. Residual used for heating amounts to about 60,000,000 bbl. for a heating season. Allowing for some preseason purchases, this still checks closely with the 300,000-bbl.-daily differential for the winter half of the year.

The addition of these normal heating demands would raise the total to 1,700,000 bbl. daily by the first quarter of next year. If consideration is given to probable increases in military purchases as well as gains in bunkering and industrial uses, potential demand in the first quarter of next year may average near 1,800,000 bbl. daily.

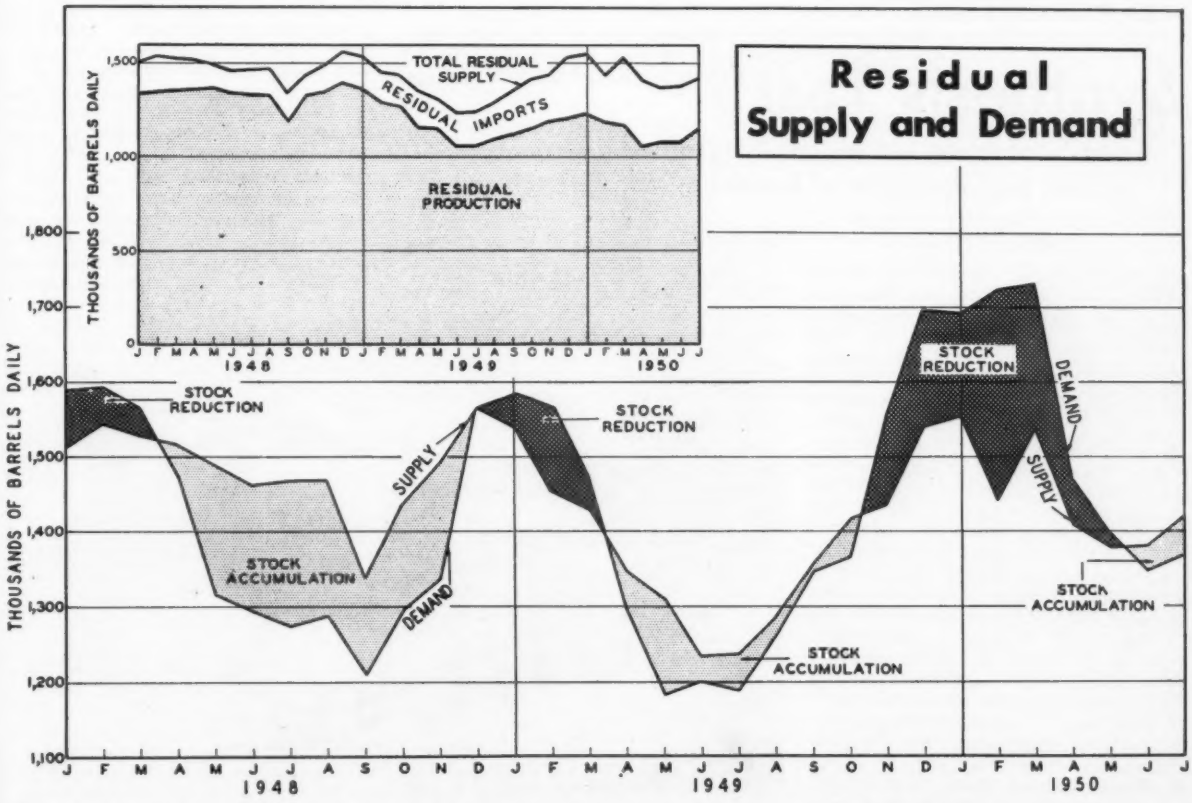
Supply. — Residual imports averaged about 300,000 bbl. daily last winter. Unless this is increased, about 1,500,000 bbl. daily from domestic sources will be needed. This will include stock reductions as well as current refinery production.

Refinery yields of residual reached 21.9 per cent last January, the highest point for the winter months. Runs of 6,200,000 bbl. daily would supply 1,350,000 bbl. daily at this rate of yield. On this basis, potential demand could be met by stock liquidations amounting to 150,000 bbl. daily or about 4,500,000 bbl. per month. At the summer rate of stock buildup, less than 3,000,000 bbl. in almost 4 months, the residual stock level at the beginning of winter will not be high enough to fill the gap between potential demand and new supply.

The term "potential demand" is used meaning probable demands under present conditions. Since many of the large users of residual can shift from residual to coal without too much trouble, heavy fuel oil must compete with coal on an energy-cost basis.

Price.—Exact cost comparisons for coal and residual fuel would have to be on a plant-to-plant basis, but for a rough average a barrel of No. 6 fuel is equivalent to .229 ton of bituminous coal.

Early in 1946 the price for residual fuel on the New York Harbor spot market was slightly above that for equivalent amount of coal, but No. 6



High demands for residual fuel last winter resulted in the greatest stock reduction since the war. Peak demands came in March. Stock accumulation in summer months has been less than normal. Imports represent a larger portion of total supply.

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prices increased faster than coal until the break at the end of 1948. Residual prices dropped rapidly and were below coal parity by the end of February 1949. They have remained below coal prices since that time.

The coal strike in the early months of this year drove many large industrial and utility users to residual. Since that time, the added factor of supply uncertainty has caused many border-line customers to continue the use of residual. For many, residual remains the cheaper fuel.

The July increase on the New York spot market from $2.05 to $2.15 a barrel had little effect on consumption because the new price is still below the estimated parity of $2.25 a barrel for most plants in the area.

Coal shift.—Increased consumption of heavy fuel by public utilities is an example of the shift from coal to heavy fuel oil. Electric-power plants used 50 per cent more residual in the first half of this year than in the same period last year and almost twice as much as in the first half of 1948. Consumption in 1948, a period of high residual prices, was less than in 1947.

The record demand of 1,732,000 bbl. daily last March was due to the effects of the coal strike and extended winter weather. Most suppliers expected a sharp reduction in demand as soon as coal was readily available, but a high percentage of those who shifted from coal to residual are still using heavy fuel oil.

West Coast.—A large part of the heavy stock liquidation in the first quarter of this year was in California. However, the reduction in West Coast stocks was made possible by shipments to the East Coast averaging about 90,000 bbl. daily. Since California stocks are now down to normal working levels, and increased military demands will fall heavily on West Coast refiners, very little residual fuel from this area will be available to meet East Coast demands this winter.

An increase in residual yields of about three percentage points at Gulf-East Coast refineries would be required if the 90,000 bbl. daily is replaced by increased production at Gulf-East Coast plants.

When the gap between demand and new supply can no longer be met by stock reductions the resulting shortage causes price increases. Higher prices stimulate production and tend to reduce demand if other fuels are available. If prices are controlled, the gap will be closed by decreased consumption through reconversions to coal despite the fact that for some plants the shift will mean an increase in fuel costs.

TECHNOLOGY

Synthesis Test

Bureau of Mines will try out its modified oil-from-coal process and equipment at Louisiana, Mo., late this fall

Bertram F. Linz

WASHINGTON.—Tests of equipment at the Louisiana, Mo., gas-synthesis plant will be undertaken by the Bureau of Mines late this fall with a view to beginning integrated operations early next year with an 80 to 100-bbl. a day unit converting coal to oil by a modified Fischer-Tropsch process.

The plant, built by Koppers Co., Inc., Pittsburgh, under a $4,915,000 design and construction contract, has been completed, and will be used to translate laboratory data into cost and engineering information useful in planning commercial-scale installations of 5,000 bbl. or more daily.

This is the second demonstration unit to be built at Louisiana, the first being a 200 to 300-bbl. a day hydrogenation plant which has been in experimental operation since early last year, employing the Bergius process for converting coal to liquid products ranging from high-octane aviation gasoline to heavy fuel oils.

Improved process.—The gas-synthesis plant will consist of five units, respectively for oxygen production, coal gasification, gas purification, hydrocarbon synthesis, and distillation. The original German process has been modified by the bureau, particularly in the method of producing and purifying the synthesis gas, the use of a rugged iron catalyst, and an improved synthesis-reaction system.

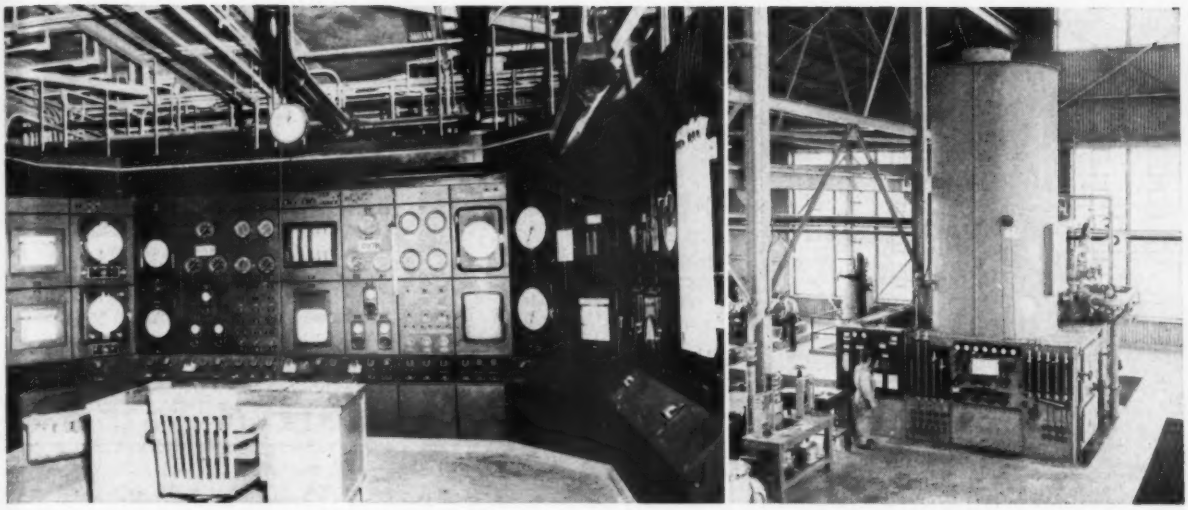
Coal gasification is the first step in both the Bergius and Fischer-Tropsch processes for the production of synthetic fuels, and also is the ranking cost problem which must be solved before a commercial industry can be created. In the Bergius process, the hydrogen obtained in part by gasification now represents 40 per cent of the cost of the liquid fuel products, while in the Fischer-Tropsch process it accounts for 60 to 70 per cent.

The gasification unit to be used at Louisiana includes equipment for unloading, conveying, pulverizing, and drying coal, a steam superheater, a Koppers gasifier to convert the pulverized coal into synthesis gas, and auxiliaries for handling the gas. Pulverized coal suspended in oxygen is fed continuously into each end of the gasifier, together with superheated steam, and the conversion takes place in a refractory-lined steel shell 6½ by 9 ft. in internal measurement, at more than 2,000° F.

The gasifier uses about 28 tons of coal, 24 tons of oxygen, and 35 tons of superheated steam to produce some 2,000,000 cu. ft. of raw synthesis gas daily and is believed to be the largest unit ever installed for direct production of synthesis gas from finely powdered coal and oxygen. Test runs have demonstrated that it can produce a gas of normal composition—41 per cent carbon monoxide, 38 per cent hydrogen, 16 per cent carbon dioxide, and 5 per cent nitrogen and impurities.

After the synthesis gas is cooled and the fine particles of dust and ash removed, the gas is compressed for purification in a triethanolamine scrubbing unit, iron oxide and alka-

Gas-synthesis demonstration plant of Bureau of Mines at Louisiana, Mo. At the left is the modified Fischer-Tropsch unit and at the right the coal-gasification unit.



Instrument and control panel of the coal-gasification unit, and the oxygen regenerator column at the Louisiana plant. In the column air is liquefied at temperatures more than 300° below zero F. to remove the nitrogen, leaving high-purity oxygen.

lyzed iron oxide towers, and carbon-absorber towers. The problems of purification and analysis are important because the amounts of impurities that can be tolerated in the gas are minute, particularly in the shape of sulfur compounds which it is desirable to reduce to 0.1 grain per 100 cu. ft. of gas in order to preserve the activity and life of the catalyst.

Novel converter.—Because of the high cost of synthesis gas, very efficient conversion to liquid products is necessary, and the bureau has designed a "jiggling bed" internally cooled converter which offers a high yield of oil and a low yield of the less valuable hydrocarbon gases. In this converter, a bed of granular catalyst of the synthetic-ammonia type is maintained in random motion as it is expanded from 10 to 30 per cent of its original volume by a constantly flowing body of coolant oil in which it is submerged. Held to be an effective answer to the heat-of-reaction problem which limited the cumbersome, expensive German converters to a capacity of 18 bbl. of oil a day, the improved converter can be built to produce many times that amount.

After leaving the converter, the mixture of gases and product vapors passes through heat exchangers to a condenser and separator for separation of gases and liquids. Part of the uncondensed gas is returned to the converter and the remainder is passed on to a carbon dioxide-removal unit and then to the distillation unit. Water is separated from the liquid condensate and the hydrocarbons sent to the distillation section for the recovery of gasoline, diesel oil, heavy distillate fuel oil, and wax.

Essentially, the distillation section performs four major functions: The removal of wax from the coolant oil to maintain the latter at proper viscosity and free from accumulations that adversely affect catalyst life; the fractional distillation of the synthesis condensate; the recovery of the light hydrocarbons from the gas stream and conversion into polymer gasoline; and the improvement of the gasoline by catalytic reforming.

The anticipated daily production of the gas-synthesis demonstration plant will include 55-60 bbl. of 75-octane gasoline, 10-12 bbl. of 80-cetane diesel oil, and approximately 12 bbl. of heavy oils and waxes suitable for cracking stock.

WEST COAST

Cuyama Discovery

Valley's third major field may develop on mountainous northwestern edge where Hancock wildcat found pay

D. H. Stormont

LOS ANGELES.—Following the completion of another oil discovery last week, the third of this year, the mountainous area north of northwestern Cuyama Valley is taking on more of the aspect of becoming the valley's third major oil field.

Latest successful Cuyama wildcat was Hancock Oil Co. 44-31 Hancock-Bishop, almost 3 miles northwest of Morales field which was discovered earlier this year. Drilled to a total depth of 6,235 ft. the test was plugged back to 6,020 ft. Drill-stem tests of an oil sand topped at 5,644 ft. indicated flowing production but it was found necessary to install pumping equipment. On an 11-hour pumping test at midweek, oil production in excess of 200 bbl. daily of 30°-gravity crude was indicated.

Located in Section 31-32s-20e, with an elevation of 3,515 ft., drilling of confirmation tests will be hindered by the mountainous terrain. Hancock has a location prepared for a northwest offset and Universal Consolidated Oil Co. has staked locations for a southeast offset and another one ⅝ mile to the northwest.

May link Superior.—While yet to be proved by the drill, some geologists believe the new discovery may link with the Superior pool of Morales field to result in a long, narrow field similar to Russell Ranch. (The later is some 3 miles southeast of the Superior pool as indicated on the accompanying map). Both the new discovery and the Superior pool are thought to be producing from lower Miocene sands.

The latter was discovered in April by Superior Oil Co. 18-2 U. S. Government, a 400-bbl. flowing well. Subsequent development, however, has been disappointing. An eastern offset was abandoned last week, a southwest offset was junked after apparently missing the pay, and the north offset was completed as a 200-bbl. pumper.

Most active area in north Cuyama is the Clayton pool where nine shallower pumpers have been completed. This pool was discovered shortly after the Superior discovery, ¾ mile to

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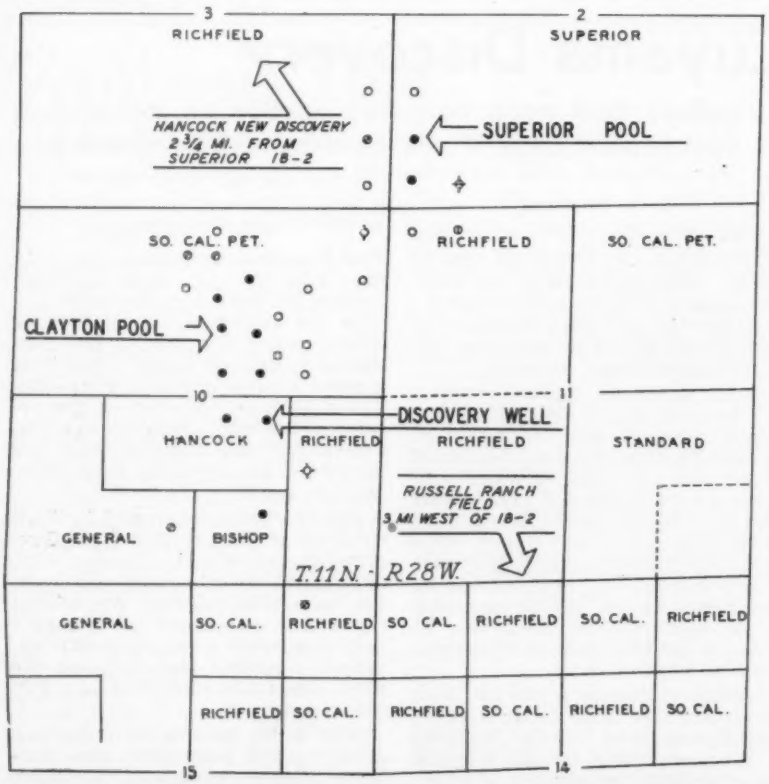
Rugged topography in the mountains north of Cuyama Valley is illustrated in this view of Superior pool. At an elevation of 3,000 ft., or about 1,000 ft. above the valley floor, sole access is the so-called "Burma Road" which winds up the ridge from the White Rock area 3 miles away. The area's newest discovery is even more remote, being in the area shown in the upper left of this photograph.

the northeast, by Hancock's 65-10 Hancock-Oceanic. It found the Miocene pay missing, drilling into the Cretaceous from the Pliocene, and was completed as a 100-bbl. pumper in the Morales sand encountered between 1,695 and 1,950 ft.

Pliocene beds. — The Pliocene beds there consist of a series of west-to-southwest dipping sands and clays, lying below the easterly dipping White Rock thrust fault. Closure is thought due to this faulting and to the lenticular nature of the pay on the southeast and northwest.

The nine wells completed to date have cut from 150 to 300 ft. of pay section in drilling to depths of 1,800 to 2,600 ft. From 30 to 70 per cent of the section is considered net pay. Permeability of the sand varies from about 150 to 4,000 millidarcys and is thought to average about 400 md. All wells were completed as pumpers, averaging over 100 bbl. daily of 32° to 37°-gravity clean crude.

Because of the area's rugged topography—the main access route to the fields is locally known as the "Burma Road"—development at first was a little slow. Adequate roads into the area have been built and locations prepared so that drilling is progressing at a faster rate.



The latest discovery in north Cuyama Valley is about 2¾ miles northwest of Morales field, shown here, where the bulk of the drilling activity is now concentrated.

EASTERN

Penn Grade Up Again

Continuing gains in demand for lubricating oils have produced the fifth advance in prices paid for Pennsylvania Grade crude oils.

The Joseph Seep Purchasing Agency of South Penn Oil Co. announced an increase of 11 cents a barrel effective August 25. This latest increase brings the price paid for Bradford-Allegheny crude to $4 a barrel. Crude from southwestern Pennsylvania districts is listed at $3.57 while Pennsylvania Grade oils from Ohio delivered to Buckeye Pipe Line Co. and West Virginia oils delivered to Eureka Pipe Line Co. carry a price of $3.51 on the new posting.

From a low of $3.40 for Bradford crude, the price climb started with an increase of 14 cents on December 12, 1949. Other advances were made on May 1, June 21, and July 19.

MEETINGS

Process-Industries Group

The fifth of a series of annual conferences on "Instrumentation for the Process Industries," sponsored by the School of Engineering, Chemical Engineering Department, Agricultural and Mechanical College of Texas, will be held at College Station October 11-13, according to P. G. Murdoch, of the department.

Instituted during 1946, the series is designed to lead to an improved understanding of the principles and practices of instrumentation as applied to problems of refineries, natural-gasoline, and cycling plants. The lectures will be directed towards instrument, design, process, and operating engineers. The course material will be presented on a practical engineering level. Theory, when needed, will be given in nonmathematical form.

LATIN AMERICA

Colombian Review

Committee reports unfavorable attitude toward foreign private investments has developed; low reserves noted

WASHINGTON.—Uncertainties over future application of Colombian laws and regulations must be eliminated if foreign investments are to be attracted for full development of oil and other resources, the Government of Colombia has been warned by a special mission sponsored by the International Bank for Reconstruction and Development which has just completed a comprehensive, integrated development program for that country.

The great bulk of direct foreign investments in Colombia in the past has been in oil and gold mining, the mission said, and until the middle of last year foreign capital appeared to have been treated reasonably fairly, but more recently "an atmosphere and economic environment unfavorable to extensive foreign private investment appear to have developed."

The mission, headed by Lauchlin Currie, included Carl W. Flesher as advisor on industry, fuels, and power, and Marshall-Moorman Development Co. as consultants on petroleum refineries.

In the course of its studies of the Colombian economy, the mission found need for further development of petroleum, refinery, and pipe-line facilities and, with respect to the first, strongly recommended that the government develop more cordial relations with American oil companies.

Limited reserves. — "Present proven oil reserves in Colombia are very limited—less than 10 years' supply at the present rate of production," it was pointed out in the mission's report to the bank and the Colombian Government. "Even if exports are sharply cut, the rising level of internal consumption, especially of gasoline, will require increasing amounts of petroleum. Moreover, the Barco reserves, which because of their quality should form the backbone of the domestic refining industry, constitute only one-third of the total.

"We believe it is extremely important to encourage intensive further exploration by private oil companies which have the experience and resources necessary to undertake this highly speculative function. It is urgent, therefore, that the government clarify its relations with the oil companies without delay along lines that will give every encouragement to mutually advantageous exploratory work."

The mission suggested also that the possibility of conserving Barco crude for internal use be studied, possibly by substituting increased exports of DeMares and Casabe crude for Barco oil "in an equitable manner."

The mission devoted considerable attention to Colombia's refinery problem, pointing out that to meet the country's needs for petroleum products, estimated to be increasing 10 per cent a year, it will be necessary to supplement the present topping units, which yield some 6 to 10 per cent gasoline, and to add modern cracking facilities giving a yield of approximately 40 per cent.

The present capacity of the unit at Barrancabermeja is 21,000 bbl. daily, and there appears to be justification for additional capacity to treat approximately 17,000 bbl. of crude a day, it said.

"We recommend that the additional required capacity be established at Barrancabermeja to take advantage of its existing facilities, its central location, and its system of connecting pipe lines," the mission reported.

Private management. — Construction of a combination crude-distillation and two-coil thermal cracking unit could be started immediately, it was pointed out, and would be economical to operate, and should not cost over $10,000,000. This expenditure would enable products to be kept in balance over the next 10 years, but the mission emphasized that this recommendation assumes that the proposed unit will be operated by experienced private management.

At the same time, it said, one loop of the Andean pipe line could be modified to permit transportation to Barranca of Barco crude, which is the only crude entirely suitable for refining to the proper breakdown of products without going to extraordinary expense in refining equipment. Crude for export and cracked fuel oil could be alternated in the other loop of the Andean pipe line for transport to Cartagena, and at the same time, if the country should ever have to import crude, it could be brought up one loop of the line.

Reports differ.—The mission pointed out that this recommendation differs from those put forth in the joint Foster Wheeler-Consejo Nacional de Petroleos report, which calls for a new refinery at Mamonal as well as additional cracking facilities at Barranca, with further provisions for expansion of the Mamonal refinery by 1955, but it was explained that in view of the shortage of proven oil reserves such a program, involving expenditures of about $35,000,000, is not felt justified.

"Moreover," the mission declared, "looking ahead, all cracking facilities should be at one location until a complete refinery of 40,000 to 50,000 bbl. per day has been developed to

CENTRAL POWER.—Open to tropic breezes, this central generating station of Kern-Trinidad Oilfields, Ltd., supplies power for pumping about 100 oil wells and other needs of the company's operation in Trinidad, B.W.I. Fuel is oil-well gas which otherwise would be wasted. Unusual problems in generator and engine design were encountered because some of the wells frequently turn to gas and unbalance the entire power system. The station is equipped with three Superior engines directly connected to 150-kw., 480-volt generators, and the power is stepped up to 3,300 volts for field transmission.

XUM

secure full operating economies. Finally, the operation of the proposed distillation unit at Mamonal up to 1955 would be wasteful of Barco crude oil. Even thereafter, the refinery at Mamonal would be uneconomic and could not show a reasonable return on the investment involved without being allowed an additional spread between refined products and crude-oil prices, an unjustifiable subsidy."

In conjunction with new refinery facilities, the mission recommended a study of the feasibility of producing anhydrous ammonia to supply Colombia's requirements for nitrogen fertilizer. This ammonia, which has a very high nitrogen content (82 per cent), can be made quite cheaply either from the gas byproduct of the refineries or from Colombia's natural gas.

Increase pipe lines. — The study showed that pipe lines now handle approximately half of the total ton-kilometers of freight traffic in Colombia, consisting mainly of crude oil for export, but it was suggested that as the domestic demand for oil products increases and supplies of crude diminish, the pattern of pipeline transportation should increasingly stress internal distribution from the refinery at Barrancabermeja.

The mission held that two extensions of the line running south from Barranca to Puerto Olaya appear fully justified on economic grounds. Distribution of products from Puerto Salgar to the Bogota area and beyond, and from Medellin to Antioquia, Caldas, and the Cauca Valley, it was concluded, can be adequately handled over the next few years by rail and truck, and consequently the mission recommended against construction of a pipe line from Buenaventura to Cali or, for the present, from Puerto Salgar to Bogota pending experience with cost-reduction measures which are recommended for the railroads in another section of the study.

Pemex' Progress

Crude production in first half was 22 per cent over 1949 rate, with gas output and refinery runs also up

INCREASE in production of crude petroleum in Mexico continued during the second quarter of 1950, according to a midyear statement by Antonio J. Bermudez, director general of Petroleos Mexicanos.

The review showed crude production in the second quarter to be 17,905,101 bbl., an increase of slightly more than 7 per cent over the first quarter total of 16,709,789 bbl.

The 1950 half-year total of 34,614,890 bbl. is, in turn, a 22.6 per cent gain over the same period of 1949, when production amounted to 28,217,269 bbl.

Gas production showed a similar upward trend, increasing 16.5 per cent over the first 1950 quarter. Output for the first half-year was more than 20 per cent above the first half of 1949.

Refinery runs of 15,613,296 bbl. for second 1950 quarter brought the total for the half year to 30,690,383 bbl., or more than 9.6 per cent above the first half of 1949.

"Drilling activity," Bermudez said, "while relatively modest on the basis of United States standards, nevertheless continued above 1949, and was more than adequate to meet the Pemex program of maintaining sufficient proved reserves to meet all foreseeable demands. Total footage drilled in the first half of this year was almost 23 per cent greater than in the first half of 1949.

"Our policy is to maintain a balance and flexibility in our drilling operations, so that the ratio between exploratory and development drilling is such that we assure ourselves at all times of an adequate cushion of proved reserves and, at the same time, an optimum production rate in the light of domestic and export demand.

"Thus, we have found it most desirable so far this year to concentrate upon development drilling, inasmuch as our reserves are at a comfortable level. At the same time, geophysical and geological surveys have been carried forward continuously, and many promising new areas have been mapped."

Bermudez predicted even greater increases in crude production during the third quarter, now that the new 30,000-bbl. refinery at Salamanca is in operation.

PEMEX OPERATIONS

	First half 1949	First half 1950
PRODUCTION		
Crude oil (bbl.)	28,217,269	34,614,890
Distillate (bbl.)	28,204	16,348
Gas*	4,440,934	5,336,763
Total	32,686,407	39,968,001
REFINERY RUNS (bbl.)		
Total	27,969,904	30,690,383
WELLS DRILLED		
Exploration	12	5
Development	56	77
Total	68	82
FOOTAGE DRILLED		
Exploration wells	94,403	41,747
Development wells	187,678	304,926
Total	282,081	346,673

*The gas is all utilized, and the figures are the calorific equivalent of the gas on the basis of 5,000 cu. ft. for a barrel of crude petroleum.

Brazil Expansion

Small refinery readied; larger plant projected

BRAZIL'S Conselho Nacional do Petroleo expects to place on stream this fall its new 2,500-bbl. domestic-crude refinery and about the same time start foundation work on a considerably larger plant designed for imported crude.

The refinery to be opened is that which is now near completion at Mataripe near Salvador in Bahia. M. W. Kellogg Co. has the contract for the project.

The refinery is equipped with a combination thermal cracking unit. Site preparation started in April 1949, and erection of units began early this year. Crude charge will be drawn from the several fields which the conselho has developed in the general area and which are now largely shut in.

Local market needs will be served principally by the refinery's production. It will be the conselho's first commercially important refining operation. There are now several small skimming plants in Brazil, operated by private Brazilian companies, one of which, Ipiranga, S. A., Cia. Brazileira de Petroleos, is reported to be now under way with a project increasing capacity of its plant at Rio Grande near the Uruguayan border from about 1,200 bbl. daily to about 5,000 bbl. daily.

The refinery on which the conselho plans to start actual construction work this fall is the 45,000-bbl. unit to be built at Cubatao near Santos. Contract for design, engineering, and supervision of construction for this project was let last year to Hydrocarbon Research, Inc.

Foreign equipment. — Purchasing of most of the equipment for the plant is being done in Europe, and this work is now in progress. An estimated less than 10 per cent of the material, based on cost, will come from the United States. This will consist of instruments and certain specialty items. Several European countries will be drawn on for the heavy equipment, with much of it coming from France, according to a conselho official.

The plant is expected to operate on Venezuelan and possibly Middle East crude. Facilities called for include a reforming and thermal cracking unit of about 18,000 bbl. capacity, a 23,000-bbl. visbreaker, and catalytic polymerization with capactity of about 4,400 bbl. daily. The refinery will produce propane, butane, aviation gasoline, motor gasoline, kerosine, diesel, and based on Tia Juana crude, about 16,700 bbl. daily of fuel oil.

Site preparation has already been

started. Water for the refinery is to be taken from a nearby hydroelectric project. The plant will be located on the dual products pipe line which the government-owned Estrada de Ferro Santos a Jundiai plans to lay from near Santos to Sao Paulo.

When it is completed in 1953 or 1954, the refinery will thus be located to meet the needs of the market in the vicinity of Sao Paulo which is an industrial city of about 2,000,000 population. The pipe line is due to be completed earlier. Cubatao, where the refinery is to be located, is about 10 miles from the Santos dock area and in front of the coastal escarpment. A large-diameter crude feed line is planned for the short distance from the dock area to the refinery.

New Colombian Minister

Dr. Manuel Carvajal, formerly a businessman in Cali, has taken office in Bogota as the new minister of petroleum of Colombia.

Dr. Carvajal was appointed with the change of administration occasioned by the inauguration of the new Colombian president, Laureano Gomez. The minister of petroleum previously was Dr. J. E. del Hierro.

The new minister indicated Colombia will continue the policy of seeking to make oil operations in the country more attractive to private capital. He said the government should make it easier for companies to obtain concessions.

"The petroleum industry in Colombia is in decadence," he said, "while consumption is increasing, production declines and interest in concessions steadily dwindles."

Dr. Carvajal's statement was made in Bogota on August 25 exactly 1 year prior to the date when the De Mares concession held by Tropical Oil Co. expires and the property reverts to government ownership. The operation of this concession after that time is still not fully settled, and the matter is a major problem for the new administration.

Colombian Pipe Line

Tropical finances 105-mile products carrier to Cali

The Colombian Government has authorized the Department of El Valle to build and operate a 105-mile products pipe line from Buenaventura to Cali.

Buenaventura is an important Colombian port on the Pacific Coast, and the pipe line project contemplates that products brought into Buenaventura by tanker would be distributed in this western region of the country by the pipe line instead of by expensive and overburdened rail transportation.

The Buenaventura-Cali line is one of several products lines planned by the government in Colombia to provide more economical distribution of petroleum products. Williams Brothers Co. is now surveying for a line from Puerto Salgar to Bogota, and the Finance Ministry has authorized notes to cover costs of a line from Cantimplora to Salgar. This latter line would connect at Cantimplora with the existing line to the Barrancabermeja refinery.

A loan from Tropical Oil Co. of Ps. 6,000,000 is financing the Salgar-Bogota line. Financing of the Buenaventura-Cali line presumably is still to be worked out.

Pressure Doubled

Creole expands capacity of Venezuelan gas plant

CREOLE PETROLEUM CORP. has announced plans for the construction of additional facilities which will increase design capacity of the Jusepin pressure-maintenance plant in Eastern Venezuela from 10,000,000 to 25,000,000 cu. ft. daily.

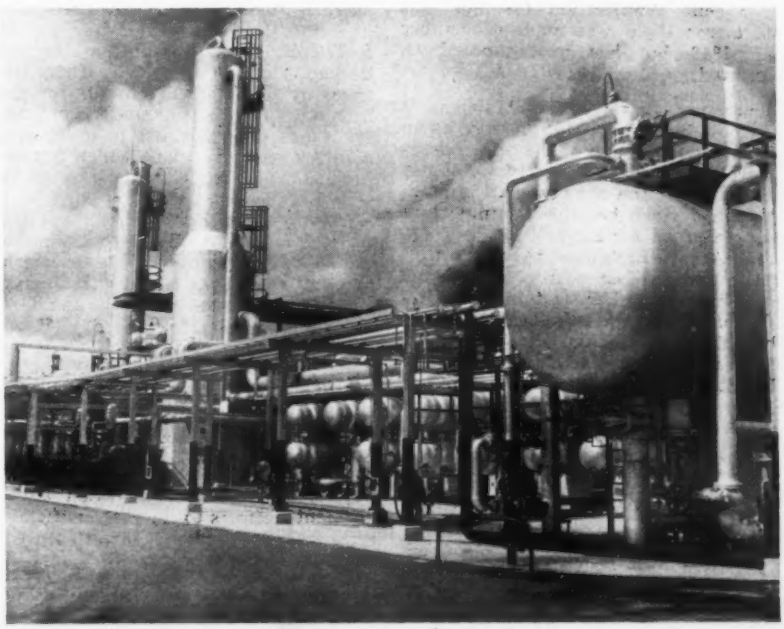
Creole is drawing up a contract with C. F. Braun & Co., Alhambra, Calif., to carry out the project. The present Jusepin plant, in Estado Monagas, is a combination crude-stabilization, desalting, dehydration, and pressure-maintenance installation. It was built by Braun and placed in operation in September 1947. The new contract involves about $2,250,000, principally for additional compressors and stabilization facilities.

The expansion of the plant, Creole said, will increase its utilization of natural gas in Venezuela by more than 5,000,000,000 cu. ft. a year. Last year the company handled 16,424,550,000 cu. ft. in the four plants which it owns wholly or in part.

Besides the Jusepin plant, Creole is jointly interested with Mene Grande Oil Co. and Pantepec Oil Co. in an identical plant in Mulata field. Creole also operates a pressure-maintenance plant at Quiriquire in Eastern Venezuela and a gasoline plant at Cumarebo in Estado Falcon.

Need larger market.—Greater utilization of oil-well gas has been a goal of Venezuelan government officials. For the oil companies, it presents problems since pipe-line outlets and markets such as are found in the United States do not exist in Venezuela. Although the various pressure-maintenance and extraction plants take large quantities, the bulk of the gas is still flared. Different schemes have been proposed, including the use of gas for iron-ore reduction in connection with the developing Venezuelan steel industry.

Venezuela's first important gas-transmission pipe line, which will draw on dry-gas sources in central Venezuela, is expected to be delivering to several states in the north-central part of the country by the middle of next year. This project is being carried out by E. Holley Poe and Atlantic Refining interests together with some local capital. Construction is expected to begin in October. Poe recently said in Caracas that the total investment might reach some $6,500,000.



View of Creole's pressure-maintenance plant at Jusepin.

XUM

Egyptian Impasse

Anglo-Egyptian directors ask mining law change before active exploration can start under new licensing pact

UNLESS changes are made in the 1948 Mining Law, it will not be possible for Anglo-Egyptian Oilfields, Ltd., to engage in active exploration work in any of the areas covered by the 21 new prospecting licenses.

The directors' report of this Royal Dutch-Shell controlled company, recently issued in London, made this statement in reviewing its operations in the country. The report made several references to the failure of the Egyptian Government to grant leases and licenses for which it had qualified. An unfavorable legal situation resulting from the 1948 Mining Law and the continued but unsuccessful negotiations between the companies and the government have almost completely halted exploration in Egypt. Standard Oil Co. (N. J.) withdrew from the country last year, and Anglo-Egyptian and Socony-Vacuum Oil Co., Inc., which operate jointly in a large part of the Sinai Peninsula, are doing practically no work except in producing areas on which leases have been confirmed under the old law.

The Anglo-Egyptian statement said that the terms of the prospecting license for Ras Matarma entitled the company to a production lease on the area on the same terms as Ras Gharib with the only difference that the royalty would be 15 per cent and not 14 per cent. Application for this Ras Matarma lease was made November 10, 1948, but has so far not been granted.

Important source. — Ras Matarma is one of the three fields discovered in Sinai since the end of the war. Leases were issued on the other two, Asl and Sudr, under the old law, and production has since become an important source of oil for Egypt's two refineries. Anglo-Egyptian reported that Sudr and Asl last year produced, for its 50 per cent share, a total of 3,559,146 bbl. This represents about 19,600 bbl. daily total from the two fields for both Socony-Vacuum and Anglo-Egyptian.

Another Sinai block being drilled is Nebwi. As for this area, Anglo-Egyptian said: "The renewal of the license at Nebwi, for which application was made September 10, 1948, and to which the company is entitled since all the obligations of the license have been fulfilled, has not yet been granted."

Anglo-Egyptian produces all of Egypt's oil except for the half share of the Sinai output belonging to Socony-Vacuum. Last year Anglo-Egyptian's total production was 12,248,030 bbl., including 8,273,039 bbl. from Ras Gharib and 316,845 bbl. from Hurghada. These two older fields are located west of the Gulf of Suez.

Discussing its operations, Anglo-Egyptian said that water produced with crude is increasing in Ras Gharib and that work is continuing on modifications and extensions to the dehydration and desalting plant. In Hurghada, one string completed five stepout wells, none commercially successful, and a cable-tool string is engaged in repairing old wells and handling abandonments. Nineteen wells were drilled last year in Sudr, of which six were successful. A deep test in Sudr was a failure. Exploratory work was restricted to existing holdings and was of a relatively minor kind.

Temporary relief. — Crude input at Anglo-Egyptian's refinery was increased to 38,000 bbl. daily at the end of last year through various operating modifications, none of an extensive nature, the statement said. It noted that Egyptian government restrictions on the manufacture of bitumen for export were lifted for a short time, with the result that sales of this product were increased 394,000 bbl. during the year.

The company completed a gas-desulfurization plant at the refinery, enabling it to sell sulfur-free gas to local consumers. "In addition, the hydrogen sulfide extracted from the gases by this plant is suitable for the manufacture of sulfur and accordingly, it has been decided to erect also a sulfur-recovery plant which is now under construction," the company said.

The prospecting licenses applied for and which Anglo-Egyptian mentioned as being impossible to work pending changes in the 1948 law have since been granted *(The Oil and Gas Journal, August 17, page 68)*. However, this action appears to contribute little toward settling the issues holding up exploration.

These issues concern more the terms under which leases would be granted if oil were found in an exploration block. Another point in dispute deals with the Egyptian Government's efforts to depress artificially prices of products manufactured from indigenous crude.

Unacceptable features.—Among other unacceptable features, the Egyptian law of 1948 requires that 51 per cent of the shares of any company holding a lease must be offered to Egyptians. Furthermore, in addition to royalties, the Egyptian Government wants the right to buy 20 per cent of production at prices 10 per cent under the world market.

Negotiations over the questions have been dragging on for months. The exploration licenses recently granted were to Anglo-Egyptian, Socony-Vacuum, and Soc. Generale Huiles et de Petrole, described as an unaffiliated French company. However, the lack of success thus far in the discussions and statements such as that made by Anglo-Egyptian show there is little prospect that the two major operators will undertake any work without changes in regard to future lease terms.

Recent statements emanating out of Cairo, in fact, indicate some in the Egyptian Government apparently feel that the government itself should get into the production end of the oil business. The Egyptian commerce minister earlier this month said that Egypt is "ready to requisition all wells and exploit them" in view of the present international situation and the "urgent necessity to give Egypt an adequate oil supply."

Kuwait Deepens Test

Kuwait Oil Co., Ltd.'s, deep test in Burghan field is drilling at about 7,000 ft. The well is to be taken probably another 2,000 ft. into the limestone formations which are believed to underlie the field's present sand production.

The hole is now through the present producing sands and the zone of the most difficult drilling which is susceptible to caving and lost returns. The first deep test undertaken was sidetracked after a fishing job below 5,000 ft. It was subsequently abandoned as a deep test but can be produced from the sand formations.

AFRICA

Durban Refinery Delayed

Plans of Union Petrol Refinery, Ltd., a Standard-Vacuum subsidiary, to construct a refinery near Durban, Union of South Africa, have been held up because of the high tariff on imported crude oil.

Last year the company announced plans to construct a plant with a capacity of 10,000 to 20,000 bbl. per day to produce gasoline, fuel oil, and lubricants, and expected to start construction early in 1950. Cost was estimated at about £5,000,000. Company officials are now negotiating with the South African Government in an attempt to secure a reduction in the import duty on crude which, it is declared, is so high as to make it more profitable to import refined products than to operate a refinery on imported crude.

XUM

PERSONALS

Tyson Promotion

Veteran executive named American Republics head

A. K. TYSON, vice president and director of American Republics Corp., Houston, has been elected president of that organization, succeeding the late Craig F. Cullinan, Sr.

A veteran of 26 years in the industry, Tyson began his career with Marland Oil Co. in 1924 as a geologist after graduating from the University of Texas with bachelor and master degrees in geology and chemistry. In 1925 he joined Pure Oil Co. and served in various places in South and West Texas until 1929. From 1929 until 1948 he was connected with Continental Oil Co. in various capacities of exploration work. He served as district geologist at San Antonio, division geologist in Houston, and manager of the land department, southern region, with headquarters in Houston.

In addition, Tyson also served as assistant secretary, as executive vice president of Navarro Oil Co. after it had been purchased by Continental, as secretary and treasurer of Continental Oil Co. of Texas, a Continental subsidiary, and as assistant secretary of Texon Group No. 1 and Group No. 2 Oil Co., all Continental subsidiaries.

In January 1948, Tyson left Continental Oil Co. to become vice president of Barber Oil Corp. and director of American Republics Corp. He became vice president of American Republics in January 1949 and continued as director.

Tyson is a member of the Independent Petroleum Association, American Petroleum Institute, and the American Association of Petroleum Geologists.

John S. Worden, formerly manager (operations), New York, in the refining department of The Texas Co., has been appointed general manager of the department in New York. He replaces **G. R. Bryant** who was recently elected vice president at Houston. Worden, a native of Olean, N. Y., and Princeton University graduate, joined Texaco in 1921 as a gager at West Tulsa and rose through various other positions until he became manager (operations), New York, in the refining department. Worden's appointment was one of a series of promotions announced by **M. Halpern,** vice president of The Texas Co. in charge of refining. The changes were effective August 15. **W. B. Logan,** assistant manager (operations), has been made manager (operations); **F. H. Holmes,** general superintendent of the Port Arthur, Tex., works, replaces Logan in New York as assistant manager (operations); **T. A. Mangelsdorf,** now superintendent of the Lockport, Ill., works, becomes general superintendent of the Port Arthur works; **H. S. McCray,** superintendent of the Lawrenceville, Ill., works, has been made superintendent of the Lockport works; and **H. A. Lord,** formerly assistant general superintendent of the terminal division, New York, will become superintendent of the Lawrenceville works.

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J. S. WORDEN

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W. B. LOGAN

F. H. HOLMES

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T. MANGELSDORF

H. S. McCRAY

Keith Bentz has been appointed superintendent of pipe-line construction for Texas-Illinois Natural Gas Pipeline Co., at Little Rock. He was formerly division superintendent for Iowa & Illinois Natural Gas Pipeline Co. of America, Geneseo, Ill.

R. W. Biggart, consulting geologist of Oklahoma City, Okla., has joined Foundation Oil Co., Tulsa, as exploration geologist. **Loyd F. Worley,** vice president and manager of the land and geological department of Foundation, reports the company is entering a more aggressive program of exploratory drilling. Biggart was formerly with British-American Oil Producing Co., and Deep Rock Oil Co.

R. I. (Jake) Jacobi, Houston refinery foreman of Sinclair Refining Co., has been appointed assistant superintendent in charge of operations for Sinclair's Hartford, Ill., plant. He is a graduate of University of Oklahoma, having received a master's degree in petroleum refinery engineering.

Robert M. Hunt has been promoted from technical assistant to supervisor of lubricating-oil and wax-manufacturing operations at the Bayonne, N. J., refinery of Tide Water Associated Oil Co.

Benedict Sarino, manager of the statistical-research department, Sun Oil Co., Philadelphia, has been appointed head of a 15-member state Economic Research Council by Governor Duff of Pennsylvania.

Keith Claiborne, chemical engineer; **Thomas L. Howe,** petroleum engineer; and **Harold Smith,** petroleum engineer, have joined Republic Oil Refining Co., Texas City, Texas.

Milton E. Erickson has been appointed division operating manager for Socony-Vacuum Oil Co., in its White Eagle division, Kansas City, Mo. He succeeds the late Ralph W. Sexson, 64, who died August 11 in Omaha, Neb., after 32 years in oil activity. Erickson joined White Eagle Oil Corp. in St. Paul, Minn., 24 years ago as clerk, winning successive promotions until he became assistant manager of the Minnesota District in 1943.

F. L. Hartley has taken the new post of general superintendent of operations at Union Oil Co.'s Wilmington area refinery in Los Angeles. **Max Parkin,** formerly superintendent at the company's Cut Bank, Mont., refinery and natural-gasoline plant, has been transferred to Wilmington as assistant superintendent of operat-

XUM

PERSONALS

ing and treating. **Frank Lammerman** succeeds Parkin at Cut Bank.

John D. Snakenberg, plant manager of the East Chicago, Ind., refinery of Cities Service Oil Co. (Del.), has been appointed chief engineer of the manufacturing department, Cities Service Co., New York. Graduating from Iowa State College, Snakenberg started as job order clerk in the Ponca City, Okla., refinery. He was advanced to pressure-still foreman at the East Gainesville, Tex., refinery, and transferred to the East Chicago refinery in 1930. There he was promoted to superintendent, and in 1947 made plant manager.

L. E. (Spike) Taylor of Maplewood. La., has been appointed plant manager, succeeding **John D. Snakenberg,** in the East Chicago refinery of Cities Service Oil Co. Following graduation from Texas A. & M. College, he became junior engineer with Cities Service, advancing to become superintendent of pressure stills at the East Chicago refinery. During World War II, he was superintendent of a butadiene and toluene plant which Cities Service built and operated for the U. S. Government at Lake Charles, La.

John F. Merriam, 46, executive vice president of Northern Natural Gas Co., Omaha, Neb., will become president of the pipe-line firm September 1. He succeeds **Burt R. Bay,** president since 1939, who will retire. Starting as a clerk when the company was formed in 1930, Merriam became assistant secretary, assistant to the president, secretary-treasurer, and vice president and treasurer. He is the son of Prof. Charles Merriam, former head of the department of political science at University of Chicago and author of many textbooks. Also he is director of U. S. National Bank, Omaha, Bankers Life Co., Des Moines, and McCord Corp., Detroit.

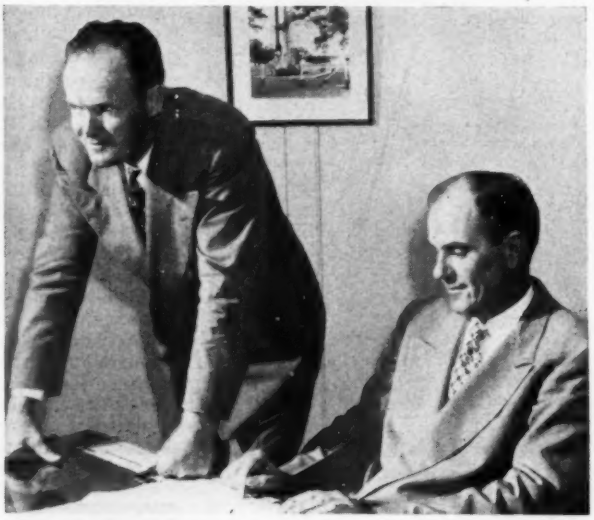
James H. Durbin has been elected to the newly created position of executive vice president of American Republics Corp., Houston. Other changes include: **C. T. Carnes** elected treasurer, succeeding Durbin; **T. Rieber,** president of the Barber Oil Corp., New York, elected chairman of the board of American Republics Corp.; and **A. J. Wray,** Houston, elected a director.

H. T. Chilton, Lubbock, has been promoted from engineer to area engineer for Service Pipe Line Co.'s West Texas division. He replaces **G. L. Maciula** who has been transferred to the engineering department in the company's general office at Tulsa.

SUNRAY PRODUCTION REALIGNMENT

PERRY GILL

A. SUMMERS



JOHN H. DOUMA *C. J. KERWIN*

John H. Douma and **C. J. (Joe) Kerwin** will supervise production activities in the Mid-Continent division of Sunray Oil Corp. under a realignment of personnel announced by **H. O. Harder,** vice president and manager of the production department, following merger of the former Barnsdall Oil Co. properties into the Sunray organization. Under **J. R. Vandever,** general superintendent of the Mid-Continent division, Kerwin will be assistant superintendent for Kansas, Oklahoma, North and West Texas, and New Mexico. Douma will be assistant superintendent for Arkansas, Louisiana, Mississippi, and Gulf and South Texas. Kerwin joined Sunray in 1948, having formerly been associated with Cities Service Co. and British-American Oil Producing Co. Douma was formerly superintendent of the development and crude-oil operations section of Barnsdall, having joined the company in 1938. Other appointments in Sunray's Mid-Continent production division include: Kansas—**C. C. Shreve,** superintendent, headquarters at Great Bend; **Fred M. McDaniel,** assistant superintendent; **Keith Lindley,** district engineer; **Hobson Mann,** engineer. Oklahoma—**Alvin R. Summers,** superintendent, headquarters at Oklahoma City; **I. T. Simmons,** assistant superintendent, Oklahoma City; **V. L. (Fred) Smith,** assistant superintendent, Wewoka; **R. R. Rothrock,** district engineer; **Freeman Hill,** engineer, Oklahoma City; **Carl W. Moot, Jr.,** district engineer, **Willard Roy,** engineer, Barnsdall; **J. F. (Duke) Dingee,** district engineer, **Tom Allen,** engineer, Wewoka; North and West Texas—**Perry A. Gill,** superintendent, **M. S. Patton,** engineer, headquarters at Midland; **Don Hall, C. C. Brunton, F. W. Ficklin,** engineers, Midland; **J. F. Binkley,** district engineer, **T. A. Bedillion,** engineer, **Gordon Hillhouse,** engineer, Snyder; **A. J. McQuiston,** district superintendent, Hobbs, N. M.; **Lee Pruitt,** district superintendent, Odessa; **Vaughn Knight,** district superintendent, Snyder; Gulf Coast and South Texas—**Carl E. Wilson,** superintendent, **Fred Goddard,** assistant superintendent, headquarters at Alice; **Joe Peery,** district engineer, **Dudley Strother,** district engineer, **J. W. Sutherland,** engineer, Alice; **Herman Owens,** engineer, **Harold F. Weakley,** engineer, Victoria; **Glenn Marrs,** engineer, Nordheim; **Floyd Newlin,** engineer, **C. T. Ramsey,** engineer, Premont; **John Myrick,** district superintendent, Houston; **John Goodman,** district superintendent, Victoria; **Howard Fish,** district superintendent, Nordheim; **Charles Baker,** district superintendent, Premont; **J. A. (Jim) Parry,** district superintendent, Hebbronville; Arkansas—**H. D. (Rags) Jones,** superintendent, headquarters at Lewisville; **Grant E. McClatchey,** district engi-

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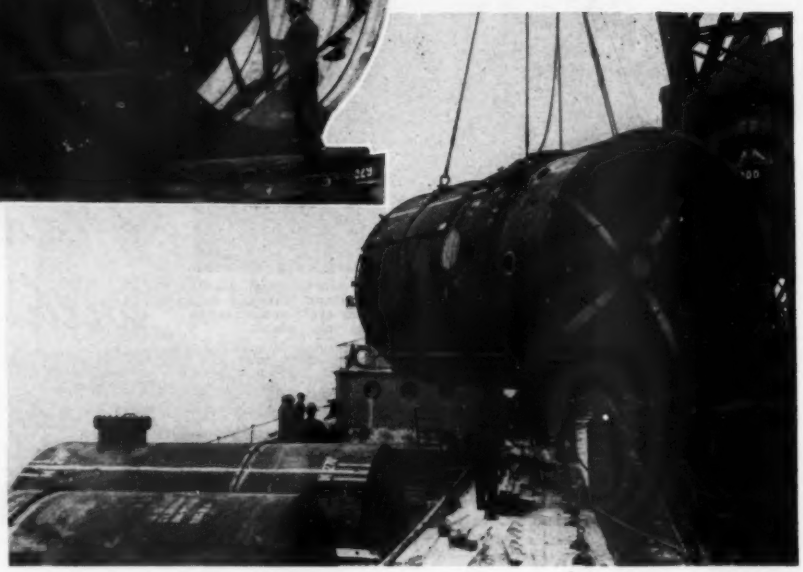

BUILDERS OF HEAVY EQUIPMENT

Sections of a synthetic-crude column are shown being loaded at one of the deep water piers of the company for shipment to Perth Amboy, New Jersey. This 90-foot high column was a part of recent production at Newport News that has included both a hot and a cold catalyst hopper, fractionator tower, reactor, and other items for the chemical and petroleum industries.

The wide range of large facilities in the 225-acre Newport News plant are particularly suited for the production of heavy equipment. Constant investigation keeps the plant abreast of the developments in manual and automatic welding methods. Modern radiographing instruments and large stress-relieving ovens are included in the plant facilities. Your inquiries are invited.

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NEWPORT NEWS, VIRGINIA

PERSONALS

neer, **W. M. Saylor,** engineer; Louisiana—**A. E. Hoffman,** superintendent, **Carl Wilson,** district engineer, **George M. Harper, Jr.,** engineer, headquarters at Lake Charles.

E. H. Todd, vice president of three wholly owned eastern subsidiaries of Standard Oil Co. of California, has been named president of one, Calmara Oil Co. Calmara, which has headquarters in New York, is engaged in marketing crude oil and petroleum products from Venezuela and crude oil from Saudi Arabia. Todd is also administrative vice president of California Oil Co. and California Refining Co., both with headquarters in Barber, N. J. He has been with California Standard companies for 34 years, and has held executive positions in California, Texas, Oregon, and Washington.

Samuel H. Elliott, Cleveland, Ohio, general manager of the transportation department of Standard Oil Co. (Ohio), has been named general sales manager of the firm. In his new position he will assist **A. A. Stambaugh,** senior vice president and director of sales. Elliott, a native of Lawrence, Kans., was graduated from the University of Kansas in 1924 with a degree of civil engineer. After taking a course with the Harvard School of Business Administration in 1929, he joined Sohio. He was active in business research in the development of product merchandising, and served thereafter for 4 years as purchasing agent. When the company began the active expansion of its pipe lines, he was named manager of the pipe-line department and later manager of all Sohio transportation operations. In 1946 he was elected a vice president and in 1949 a director. **Charles E. Spahr,** Cleveland, who has been assistant to Elliott, has been named manager of the transportation department, reporting directly to the president. Spahr's service with Sohio covers 11 years, including a period of 4 years of leave of absence with the U. S. Army to engage in construction of the India-China pipe line. He was the major in charge of construction of the 570-mile Chittagong-Tinsukia section of the Burma emergency fuel pipe line which was built to supply gasoline for the long-range bombers.

S. H. ELLIOTT

C. E. SPAHR

Marshall R. Joy has been appointed superintendent of drilling, construction, and production for Brazos Oil & Gas Co., Rosscommon, Mich., a subsidiary of Dow Chemical Co. He resigned as superintendent of production for Toklan Production Co., Tulsa. For 20 years he was connected with Cities Service Oil Co., serving in many areas.

John J. Knebles of the Fort Worth geological department of the Sinclair Oil & Gas Co., has been transferred to the Amarillo office.

Walter N. Kellogg has been made petroleum engineer with Sunray Oil Corp., Tulsa. He was formerly reservoir engineer at San Antonio, Tex.

M. R. Burditt, geologist with Oil Development Co. of Texas, has been transferred from Midland to Amarillo, Tex.

Harold E. Berg, formerly division engineer, has been promoted by Tide Water Associated Oil Co. to division superintendent in charge of operations in Oklahoma, Kansas, and North Central Texas.

E. F. MORRILL

Edward F. Morrill has been named president of the Mid-Valley Pipeline Co. succeeding **William C. Kinsolving** who was elected chairman of the board of directors. Morrill, a native of Springfield, Ill., and a graduate of Case Institute of Technology, has had wide experience in pipe-line operations. Starting as a service-station employe, he later joined the transportation engineering division, later becoming assistant manager of transportation operations and president of Sohio Pipe Line Co.

George Darrow, consulting geologist specializing in petroleum exploration, has resigned as geologist with Amerada Petroleum Corp. His activities were out of Billings, Mont.

Paul J. Orchard, formerly with the California Co., New Orleans, has been appointed geologist with American Republics Corp., Houston, Tex.

George L. Ellis has been named division geophysical coordinator for the North Texas-New Mexico division of Stanolind Oil & Gas Co. at Fort Worth. He joined Stanolind in 1945 and for the past 2 years has been a senior geologist at Fort Worth.

DEATHS

William D. Donaldson, 73, pioneer driller in Washington County oil fields, died at Dewey, Okla. He was a resident in that area since 1902.

R. F. McCrory, 72, pioneer oil operator and rancher, died in Ardmore, Okla. An arrival before statehood, he owned and operated an 8,000-acre ranch.

Joel Marion Eaton, 83, pioneer oil man of the Kansas and North-Central Texas fields, died in Brownwood, Tex. In 1885 he came from Indiana, engaging in oil activity until his retirement. He launched the movement to build a refinery in Brownwood.

Charles Stuart Lockwood, 81, formerly connected with Skelly Oil Co., and wartime defense official, died in Ventura, Calif. Trained in law, he was active in the oil industry for 17 years. He was a veteran of the Cherokee Strip run into Indian Territory in 1893. One of his two sons, Clarence D. Lockwood, Houston, is publisher of an oil report.

W. A. Markham, 87, independent oil operator, died August 25 in Broken Arrow, Okla. With associates he developed one of the first producing oil leases in Broken Arrow.

Andrew Raffel, 66, cofounder and secretary-treasurer of Midco Oil Corp., died August 26 in Tulsa. Born in England, he entered the oil business in America as an office manager with Eugene Constantin, president of the Constantin refinery interests.

Harry C. Hanszen, 66, former vice president of Gulf Oil Corp., died August 26 in Houston. He entered the oil industry as a scout for Gypsy Oil & Gas Co., now a Gulf subsidiary, and at his death was a director of Mikton Oil Corp. and 15 other Houston oil concerns.

H. W. Brown, 65, head of Sun Oil Co. field payroll department, died August 23 while vacationing in Montrose, Colo. His home was in Caney, Kans.

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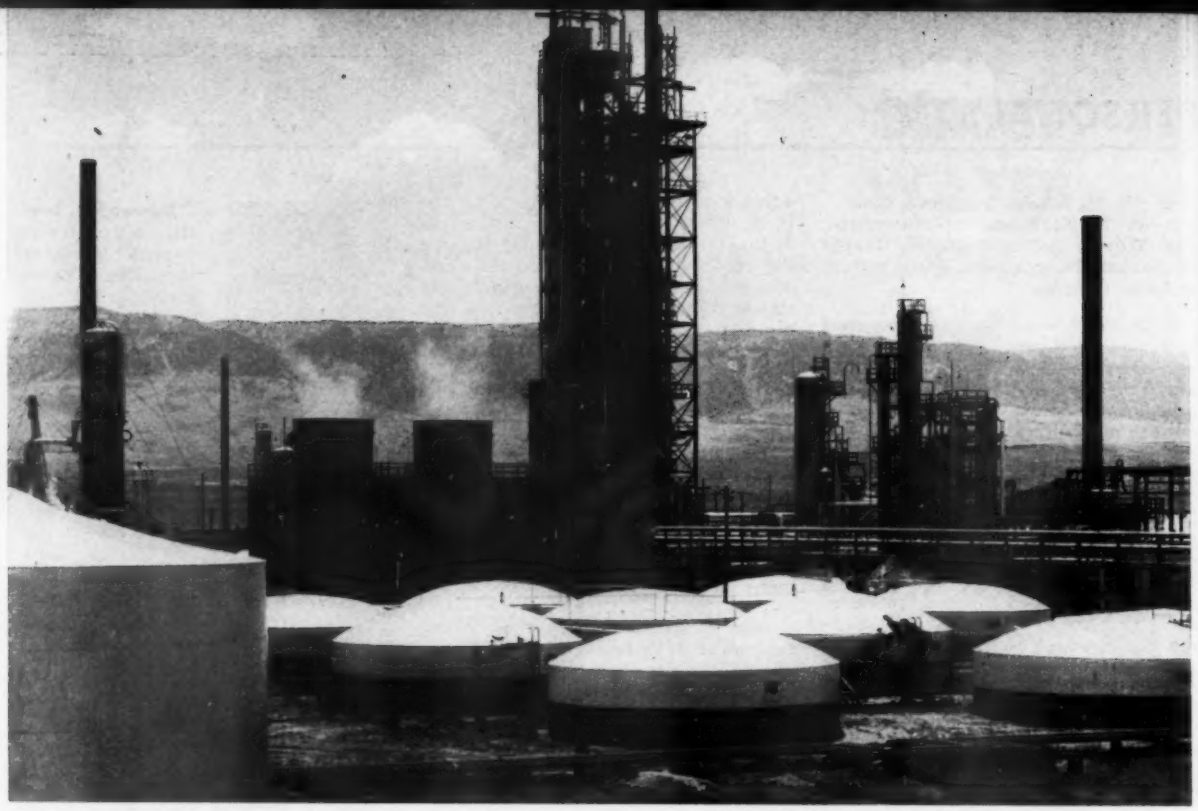

As the principal unit at Socony-Vacuum's Casper refinery, the new T.C.C. unit designed for liquid feed, charges 3,400 bbl. per day of fresh feed comprising a wide range of gas oils from sweet and sour Wyoming crudes. The cat cracker with incorporated catalytic polymerization facilities, right, enables operators to produce gasoline with octanes to spare for the Rocky Mountain market.

T.C.C. Liquid-Feed Operations

by George Weber
Refining Editor

IN early summer, a new Thermofor catalytic cracking unit at the Casper, Wyo., refinery of Socony-Vacuum Oil Co., Inc., rounded out its first full year of operation on combined vapor and liquid feed. This unit was the first to be originally engineered to handle liquid as well as vapor feed to the reactor.

Selection of a liquid-feed process for Casper was a matter of plant economics. The 6,000-bbl. refinery is relatively small and cannot justify auxiliary vis-breaking facilities for handling heavy feed stocks. It incorporates no lube-oil manufacture, and processes several heavy sour crudes. Thus a process which would convert a maximum range of gas oils to gasoline and other more valuable distillates was economically necessary.

Processing the widest range of gas oils obtainable by distillation, the new T.C.C. unit has performed in accordance with design specifications to produce high gasoline and distillate yields. In conjunction with other refinery units, the unit produces gasoline of top specification quality for the Rocky Mountain area.

Performance Test

Following completion of the T.C.C. unit's first year of operation, a 2-week test run was conducted on the entire refinery. This run was supervised by the refinery manager, E. T. Pummill, and White Eagle Division's chief engineer, E. M. Skinner. Test-run data, presented here, are representative of over-all refinery operation during the past year.

The Casper refinery was expanded and modernized in early 1949 by addition of the cat unit, diversion of former thermal cracking facilities to expanded crude processing, and addition of auxiliary refining facilities. Sweet and sour Wyoming crudes are charged separately to two conventional two-stage atmospheric-vacuum-distillation units. Sweet, green crudes comprise mainly those from nearby Cole Creek, South Cole Creek, and Big Muddy fields, and average about 35° A.P.I. gravity. A pipe-line mix of nine or more sour crudes from

TABLE 1—ULTIMATE T.C.C. YIELDS INCLUDING CATALYTIC POLYMERIZATION

	B.P.D.	Vol. per cent Fresh feed	Pounds Per hour	Wt. per cent Fresh feed
10.5-lb. R.v.p. 400°-e.p. gasoline*	2,331	68.72	24,840	56.06
Excess butanes	232	6.83	1,920	4.33
400-500 cracked distillate	395	11.64	5,115	11.54
Synthetic bottoms	421	12.41	6,115	13.80
C_4 and heavier liquid recovery	3,379	99.60		
Propane and lighter			2,988	6.74
Carbon			3,336	7.53
Total			44,314	100.00

*10.5-lb. R.v.p. is weighted average for winter and summer.

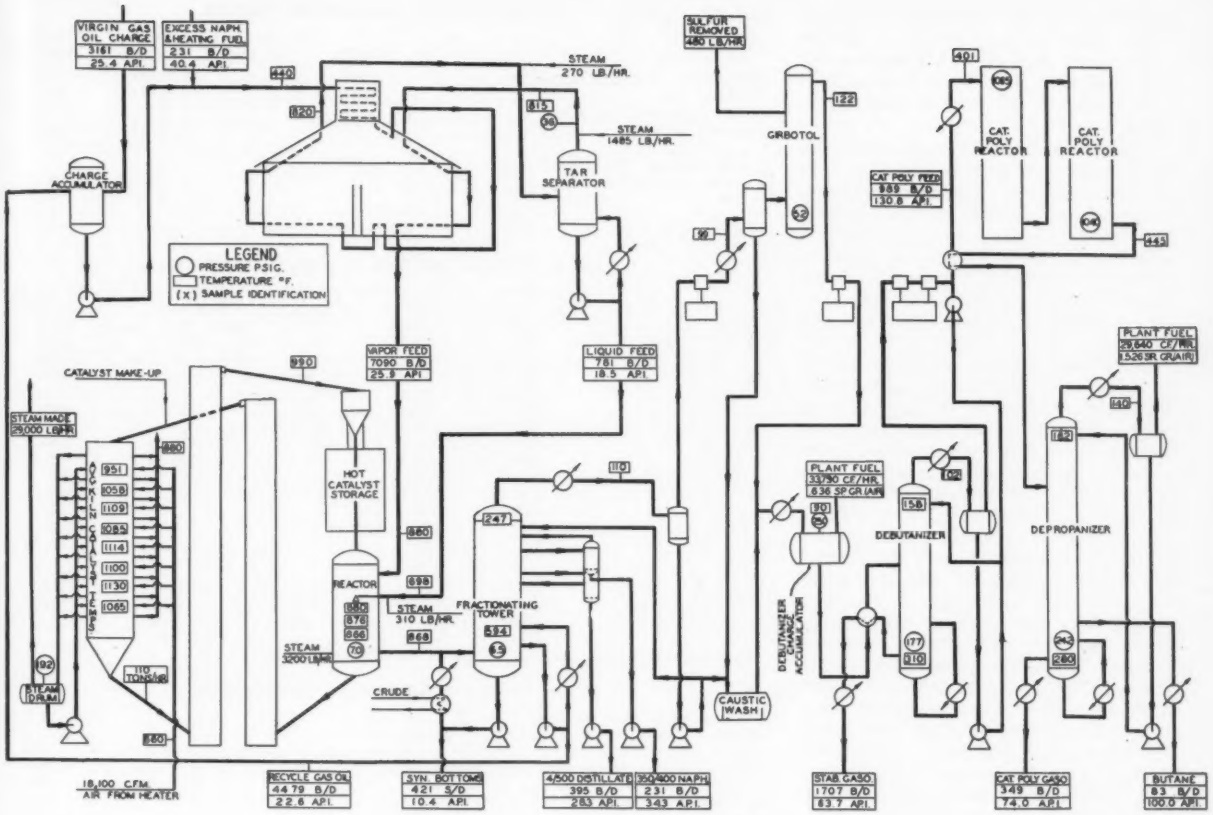

Fig. 1—Schematic flow of T.C.C. and auxiliary units.

. . . at Socony-Vacuum's Casper, Wyo., Refinery

Process, dictated by economics, converts a maximum range of gas oils to gasoline and to other more valuable distillates

North Central Wyoming, averaging 26° to 28° A.P.I. gravity, supplement refinery runs.

The two crude units (Fig. 3) produce conventional straightrun distillate fractions and recover heavy vacuum gas-oil fractions for catalytic feed stock. Crudes are reduced to 130-140 soft point asphalts, comprising about 7 per cent crude and 14-15 per cent sour-crude bottoms.

T.C.C. Unit

The T.C.C. unit is of conventional postwar design. The principal exception is the reactor design providing liquid feed, and the operation of the feed-preparation section. In these respects the unit is the forerunner of several of the newer, company-designed modified T.C.C. units now under construction in this country.

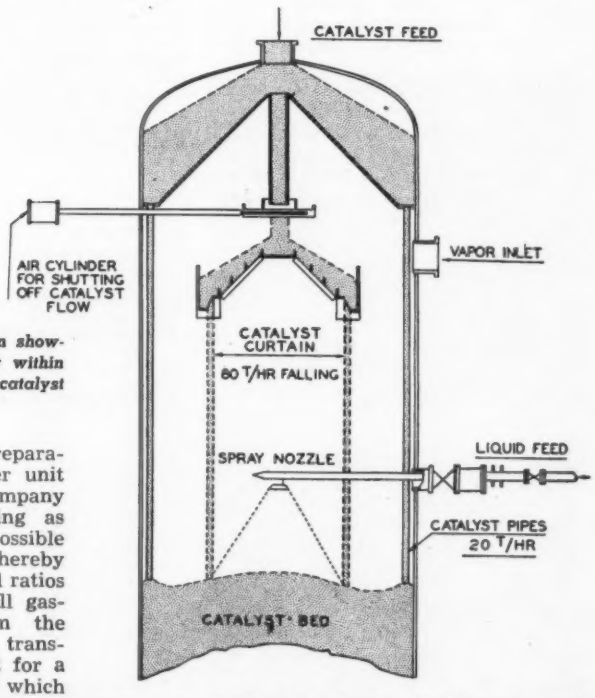

Fig. 2—Reactor design showing liquid feed spray within the circular falling catalyst curtain.

Reactor feed preparation in the Casper unit conforms to the company policy of providing as much preheat as possible in the feed stock, thereby holding catalyst-oil ratios to a minimum. All gas-oil streams from the crude units are transferred hot, except for a minimum quantity which must be handled through storage to provide process balance.

In the charge accumulator, combined virgin gas-oil streams from the crude units join with recycle gas oil and some excess straightrun naphtha and heating fuel streams (Fig. 1). The combination heater raises charge-stock temperature from 440° to 820° F. and the combined stream is flashed

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at 800° F. in the tar separator. Separator overhead is given a further heat boost before entering the reactor at 880° F. Tar separator bottoms comprise the liquid feed to the reactor.

With this type of operation, the feed stock provides maximum heat to the catalytic cracking reaction. The required balance of heat is provided by hot regenerated catalyst which is limited to a handling temperature of 990° F. in the elevator. Lower catalyst-oil ratios are thus allowed, minimizing coke laydown and gas loss.

Still lower catalyst-oil ratios would be required if vapor feed alone were employed. Inclusion of liquid feed to the reactor, while requiring some increase in catalyst circulation, more than compensates by providing for the cracking of a heavier fraction of the crude charge.

The reactor provides concurrent contact of feed stock with the downward moving catalyst bed, allowing the simplified stripping of reaction products at the base of the vessel. About 80 per cent of the catalyst drops to bed level in a circular falling curtain (Fig. 2). A concentric spray of liquid feed within the curtain contacts with the catalyst at bed level and becomes instantly vaporized. Stripped catalyst moves to the eight-zone regenerator kiln, and cracked reactor effluent is processed in conventional fractionation and vapor-recovery units. Unsaturated light hydrocarbons are further processed in a U.O.P. catalytic polymerization unit.

The unit employs mechanical bucket lift for catalyst in two elevators. Both operate within cylindrical shells which are insulated on the outside. At the average catalyst circulation rate of 110 tons per hour, amounting to a catalyst-oil ratio of 2.9 to 1, make-up for catalyst attrition alone does not suffice to maintain the desired

TABLE 2—T.C.C. COMPONENT YIELDS

	B.P.D.	Vol. per cent Fresh feed	Pounds Per hour	Wt. per cent Fresh feed
Debutanizer 400°-e.p. gasoline	1,947	57.5	20,825	47.0
Butanes	547	16.1	4,662	10.5
400-500 cracked distillate	395	11.6	5,115	11.5
Synthetic bottoms	421	12.4	6,115	13.9
C_4 and heavier liquid recovery	3,310	97.6		
Propane and lighter			4,261	9.6
Carbon			3,336	7.5
Total			44,314	100.0

TABLE 3—T.C.C. CHARGE-STOCK INSPECTIONS

Charge—	Total charge including recycle	Excess naphtha	Tar separator overhead	Tar separator bottoms	T.C.C. recycle gas oil
Quantity, bbl. day	7,875	231	7,094	781	4,479
Gravity, °A.P.I.	24.9	40.4	25.9	18.5	22.6
Type distillation	Vacuum* Engler	A.S.T.M.	Vacuum Engler	Vacuum Engler	Vacuum Engler
I.b.p.	400	310	425	440	414
10	500	365	490	605	509
20	525	384	522	690	525
30	551	398	539	765	538
40	580	412	565	827	550
50	611	426	588	†871	565
60	648	440	614		595
70	690	456	646		626
80	739	474	692		660
90	819	504	775		692
EP		590			
Analine No., °F.	143.2		148.6	178.5	112.5
Sulfur wt., per cent	1.23	.21	1.2	1.61	1.27
Conradson carbon	.29		.05	2.94	

*All Vacuum Engler data corrected to 760 MM. †Cracking.

TABLE 4—T.C.C. OPERATING CONDITIONS

Space velocity, total feed	1.62
Catalyst-oil ratio, volume percent (total charge)	2.90
Catalyst to reactor, °F.	990
Average catalyst temperature in reactor, °F.	875
Vapor feed to reactor, °F.	890
Liquid feed to reactor, °F.	698
Catalyst activity	29.9
Recycle ratio by volume	1.32 to 1
Gravity of fresh feed, °A.P.I.	27.8
Volume per cent liquid feed in total reactor charge	9.9
Volume per cent liquid feed based on fresh feed	23.2
Steam, weight per cent total feed	2.2
Reactor top pressure, psig.	9.5
Catalyst circulation, tons per hour	110
Carbon on spent catalyst, weight per cent	1.90
Carbon on regenerated catalyst, weight per cent	.47
Kiln steam prod. pounds per hour (net)	29,000
Average kiln catalyst temperature, °F.	1,075
Sulfur removed in Girbotol, pounds per hour	430

Table 5-Product

	Sweet crude products					Sour crude products			
Product—	300° e.p. gasoline	300/400 naphtha	400/500 distillate	500/600 diesel	140 S.P. asphalt	300 e.p. gasoline	300/400 naphtha	400/500 distillate	140 S.P. asphalt
Quantity, bbl. per day	533	72	560	159	212	558	278	303	493
°A.P.I.	63.3	48.7	41.6	36.9	6.8	61.6	46.0	40.3	4.0
Specific gravity, 60/60	.7264	.7852	.8174	.8403	1.023	.7328	.7972	.8236	1.0445
Type dist. (per cent recovery):	A.S.T.M.	A.S.T.M.	A.S.T.M.	A.S.T.M.	....	A.S.T.M.	A.S.T.M.	A.S.T.M.	.....
I.b.p.	110	286	356	440	....	114	308	340	.....
10	156	307	370	517	....	163	330	392	.....
20	180	317	400	534	....	184	336	407	.....
30	197	322	410	540	....	198	343	416	.....
40	210	323	430	550	....	213	348	424	.....
50	223	326	440	554	....	226	353	430	.....
60	234	328	453	560	....	238	358	437	.....
70	246	332	470	567	....	252	365	443	.....
80	262	336	485	575	....	266	374	450	.....
90	279	359	508	587	....	282	387	463	.....
End point	324	434	538	626	....	335	430	495	.....
Per cent rec.	97	98	97	98	....	99	98	99	.....
Aniline No., °F.	....	140	155.5	176	....	....	130.5	146.8	.....
Sulfur, weight per cent	.0165	.0138	.027	.07	....	.096	.052	0.648	.....
Soft point	....	....	....	....	138	....	....	....	131
Flash	....	....	....	183 PM	....	....	....	....	.....
R.v.p.	6.1	....	....	....	....	4.3	....	....	.....
Octane No.:									
Research, clear	58.2	....	....	....	....	54.1	....	....	.....
Research, 1 cc.	74.7	....	....	....	....	63.5	....	....	.....
Research, 2 cc.	81.3	....	....	....	....	68.5	....	....	.....
Research, 3 cc.	85.4	....	....	....	....	71.8	....	....	.....

*Vacuum Engler corrected to 760 mm.

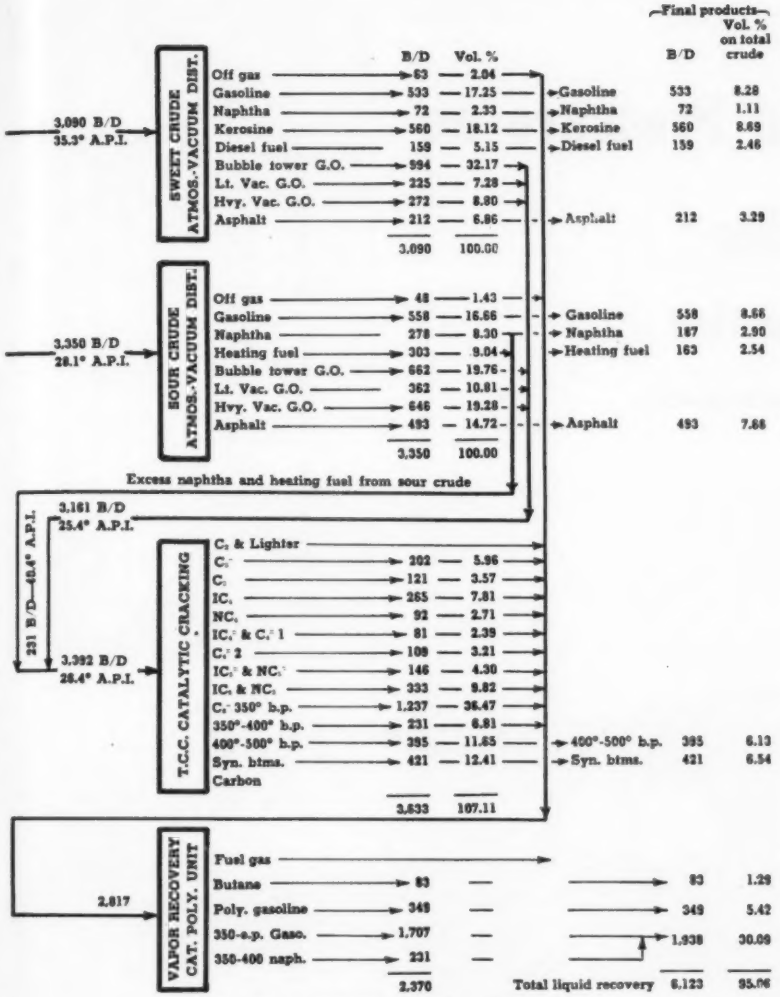

Final products
B/D
Vol. %
Vol. % on total crude
3,090 B/D
35.3° A.P.I.
SWEET CRUDE ATMOS.-VACUUM DIST.
Off gas 53 2.04
Gasoline 533 17.25 → Gasoline 533 8.28
Naphtha 72 2.33 → Naphtha 72 1.11
Kerosine 560 18.12 → Kerosine 560 8.69
Diesel fuel 159 5.15 → Diesel fuel 159 2.46
Bubble tower G.O. 994 32.17
Lt. Vac. G.O. 225 7.28
Hvy. Vac. G.O. 272 8.80
Asphalt 212 6.86 → Asphalt 212 3.29
3,090 100.00
3,350 B/D
28.1° A.P.I.
SOUR CRUDE ATMOS.-VACUUM DIST.
Off gas 48 1.43
Gasoline 558 16.66 → Gasoline 558 8.66
Naphtha 278 8.30 → Naphtha 187 2.90
Heating fuel 303 9.04 → Heating fuel 163 2.54
Bubble tower G.O. 662 19.76
Lt. Vac. G.O. 362 10.81
Hvy. Vac. G.O. 646 19.28
Asphalt 493 14.72 → Asphalt 493 7.66
3,350 100.00
Excess naphtha and heating fuel from sour crude
3,161 B/D
25.4° A.P.I.
231 B/D—46.4° A.P.I.
3,392 B/D
28.4° A.P.I.
T.C.C. CATALYTIC CRACKING
C3 & Lighter
C4 202 5.96
C5 121 3.57
IC5 265 7.81
NC5 92 2.71
IC5 & C5 1 81 2.39
C5 2 109 3.21
IC5 & NC5 146 4.30
IC6 & NC6 333 9.82
C7 350° b.p. 1,237 36.47
350°-400° b.p. 231 6.81
400°-500° b.p. 395 11.65 → 400°-500° b.p. 395 6.13
Syn. btms. 421 12.41 → Syn. btms. 421 6.54
Carbon
3,833 107.11
2,817
VAPOR RECOVERY CAT. POLY. UNIT
Fuel gas
Butane 83 → 83 1.29
Poly. gasoline 349 → 349 5.42
350-e.p. Gaso. 1,707 → 1,938 30.09
350-400 naph. 231
2,370
Total liquid recovery 6,123 95.06

Fig. 3—Volume material balance.

Inspections

T.C.C. products						Blended gasolines	
Debutanizer bottoms	350/400 naphtha	400/450 distillate	Synthetic tower bottoms	Cat. poly. gasoline	Butane side stream	T.C.C. gasoline, 400° e.p. 10.5-lb. R.v.p.	T.C.C. & cat poly. gasoline, 400° e.p. 10.5-lb. R.v.p.
1,707	231	395	421	349	83	....	....
63.7	34.3	28.3	10.4	74.0	100.0	61.9	62.2
.7249	.8534	.8855	.9972	.6886	.6112	.7316	.7305
A.S.T.M.	A.S.T.M.	A.S.T.M.	Vac. Eng.*	....	....	A.S.T.M.	A.S.T.M.
98	336	385	415	....	....	83	92
121	348	407	565	....	....	115	119
133	354	414	627	....	....	133	142
145	347	418	668	....	....	151	162
164	360	423	700	....	....	174	187
185	364	428	725	....	....	202	212
207	367	433	757	....	....	235	243
235	372	439	795	....	....	274	277
266	379	446	838	....	....	308	313
296	392	459	Cracking	....	....	350	351
354	430	492	....	....	....	404	408
99	99	99	....	....	....	98	97
99.0	62.5	77.5	130.5	....	....	....	....
.042	.206	.741	1.79	.029	.026	.062	.058
....	....	....	....	....	....	....	....
....	138 TC	174 TC	....	....	....	....	....
7.5	....	....	....	21.8	48.5	10.3	10.3
....	....	....	....	....	....	89.5	90.5
....	....	....	....	....	....	95.0	95.4
....	....	....	....	....	....	96.4	96.9
....	....	....	....	....	....	97.2	97.9

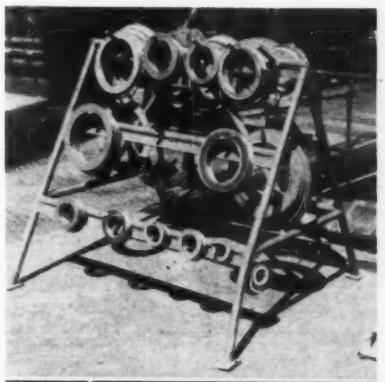
catalyst activity at 30. Stack losses run about 0.4 ton per day and make-up is added at the rate of about 1 ton per day.

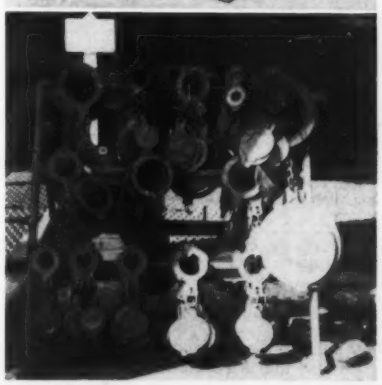
During the test run, yields on the T.C.C. unit as shown in Tables 1 and 2 obtained. These data do not include straightrun yields from the crude units. T.C.C. charge-stock inspections, Table 3, are broken down to show total charge to the tar separator, and liquid and vapor feeds. The specific conditions under which the T.C.C. unit operated are outlined in Table 4. The over-all refinery volume material balance, (Fig. 3) reflects average operating yields, and the consolidated listing of principal product inspections, Table 5, shows the quality of T.C.C. and poly gasoline blends.

Racks for Cleanout Accessories

BLANKING off certain groups of piping and reassembling flanged fittings can be accomplished more easily and without appreciable loss of time, when gaskets and spectacle blanks are placed within convenient reach of the pipe fitters or boilermakers. Racks are being employed upon which these pieces of equipment are placed so that any size fitting can be serviced.

The racks themselves are simple gable ended A-frames with several cross bars fitted with long studs, upon which the gaskets or blanking flanges can be stored. The legs of the frames are fitted with generous sized plates.





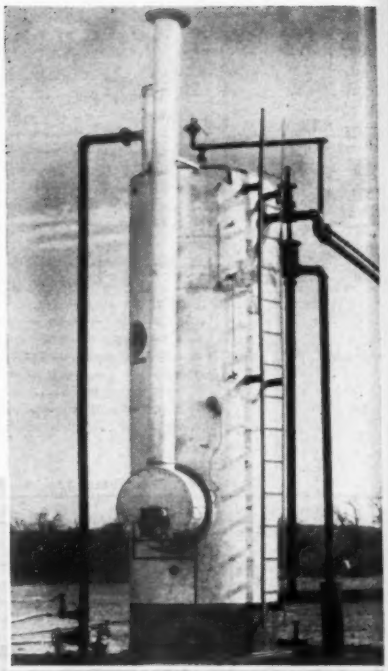
XUM

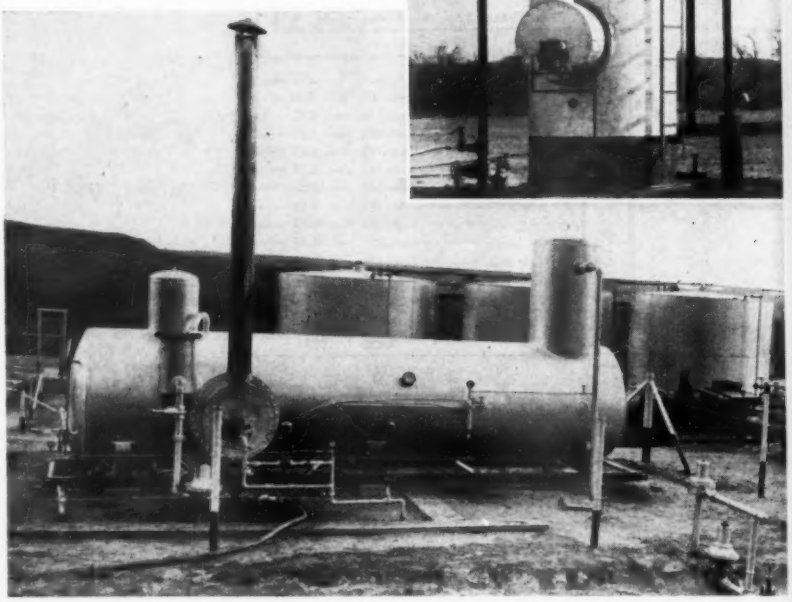
Effect of

Temperature and Pressure on Crude-Oil Gravities

In a Typical Mid-Continent Field

by R. L. Huntington*





Top: Horizontal crude-oil emulsion treater. Above: Vertical-type crude-oil emulsion treater.

The relationship of crude oil gravity to volumetric shrinkage, for each of five representative Mid-Continent crude oils, recently was discussed by the author in The Oil and Gas Journal†. From these data the oil producer can obtain some idea of the economics of reducing vaporization losses through the installation of cooling equipment and heat exchangers.

A TYPICAL Mid-Continent oil field has been studied in order to obtain information on the effect of temperature and pressure on the A.P.I. gravity of the crude from that area. This field had a gas-oil ratio of about 1,200 cu. ft. of gas per barrel of oil when it was first discovered in the early forties, but since then the ratio has climbed to 15,000 due largely to the lack of a water drive and to the low permeability of the formation. The gas-oil ratio is still increasing, therefore the producers realize the importance of reducing vaporization losses caused by the stripping action of the gas in the flow lines and separators.

*School of Chemical Engineering, University of Oklahoma, Norman, Okla.

†Economics of Reducing Crude-Oil Vaporization Losses, Huntington, R. L., The Oil and Gas Journal, June 15, 1950.

Seasonal Temperature Changes on Oil Gravities

A study of the run tickets from several representative leases producing emulsion-free crude oil brought out the results shown in Fig. 1. The 2° A.P.I. swing in gravity between winter and summer, when translated

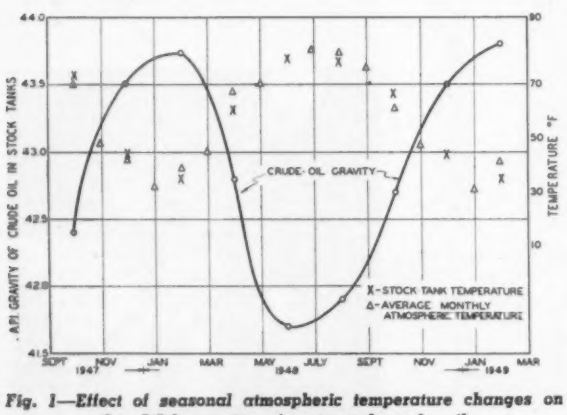


Fig. 1—Effect of seasonal atmospheric temperature changes on the A.P.I. gravity of untreated crude oil.

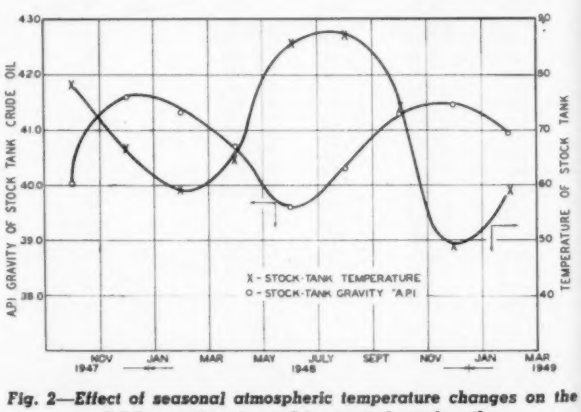


Fig. 2—Effect of seasonal atmospheric temperature changes on the A.P.I. gravity of emulsion-treated crude oil.

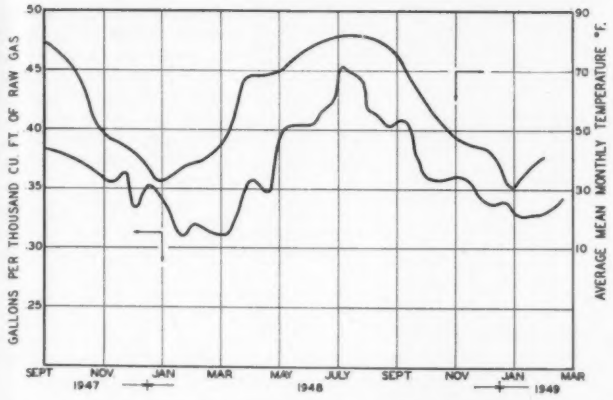


Fig. 3—Effect of seasonal atmospheric temperature changes on the natural-gasoline content of gas from field separators.

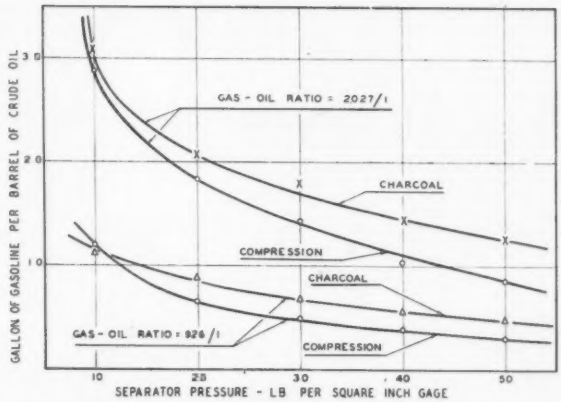


Fig. 4—Effect of separator pressure on natural-gasoline content of raw gas.

into volumetric change, means that the oil shrinks about 7 per cent between January and July due to the heavier vapor losses in the summer time. A large portion of this loss in gravity occurs in the oil-gas separators, but since the richer gas is processed in efficient recovery plants, the financial loss for the field is practically offset by the gain in natural gasoline production.

Fig. 1, however, does point out the need for the following:

1. The burying of flow lines between the wells and the separators so as to reduce fluid temperatures in the summer time.

2. The maintenance of bright aluminum surfaces on the separators and stock tanks for temperature reduction.

3. The replacement of large stock tanks with small ones, coincident with the declining oil production, in order to shorten storage time.

When crude oil emulsions are treated, the application of heat is usually necessary along with chemicals for the production of pipe-line oil. If the treated crude oil is not cooled by heat exchange on its way to storage, the vapor losses will be greater. The oil gravities on four representative leases where emulsion treating is being carried out are shown in Fig. 2 and Table 1. The seasonal changes in gravity take place in a manner similar to the untreated crude oil leases (Fig. 1), however, the average gravity runs from 1° to 2° A.P.I. lower due to the additional heat absorbed in the treating operation.

Natural Gasoline Content of Gas

The lower crude-oil gravities which prevail in the summer time are offset by the richer gasoline content of the separator gas. This change in gasoline content is shown in Fig. 3 along with the seasonal change in atmospheric temperature which runs parallel with the content curve.

The increase of 0.15 gal. of gasoline per 1,000 s.c.f. of gas according to the charcoal test, means that 2.25 gal. of gasoline are stripped from each barrel of crude oil since the gas-oil ratio is 15,000 s.c.f. per bbl. The 2.25 gal. represent 5.33 per cent of a barrel. The remaining 1.67 per cent of a barrel loss probably takes place in the stock tanks due to the higher temperatures which prevail from June to September.

Effect of Separator Pressure on G.P.M.

A series of field tests (both compression and charcoal) were made on several oil-gas separators by varying the pressure in 10-lb. intervals from 10 up to 50 psig. It is easily seen by referring to Fig. 4 that an increasing pressure causes a marked decline in gasoline content. The charcoal and compression tests practically coincide for the richer gas from the 10-psi. separator whereas the charcoal test is more efficient for the leaner gas coming from the 50-psig. separator. It is customary for most field tests to be made with charcoal as long as the content falls below 1.50 gal. per 1,000 s.c.f. of gas.

Optimum Operating Conditions

Separator pressures are frequently determined by the capacity of the pipe lines and compressors which deliver the field gas to the absorbers. In other cases the back pressure against which the well will flow governs the operations. When the oil producer is free to vary the separator pressure, the optimum condition is usually the one which results in the production of the highest-gravity crude oil for pipe-line delivery. However, in the case of a unitized operation, the retention of the lighter ends in the crude oil may not be looked upon as good economics depending upon the relative prices of crude oil and natural gasoline products. Then too, there is no advantage in producing a maximum-gravity crude oil if the lighter fractions are to be lost by a long period of atmospheric storage.

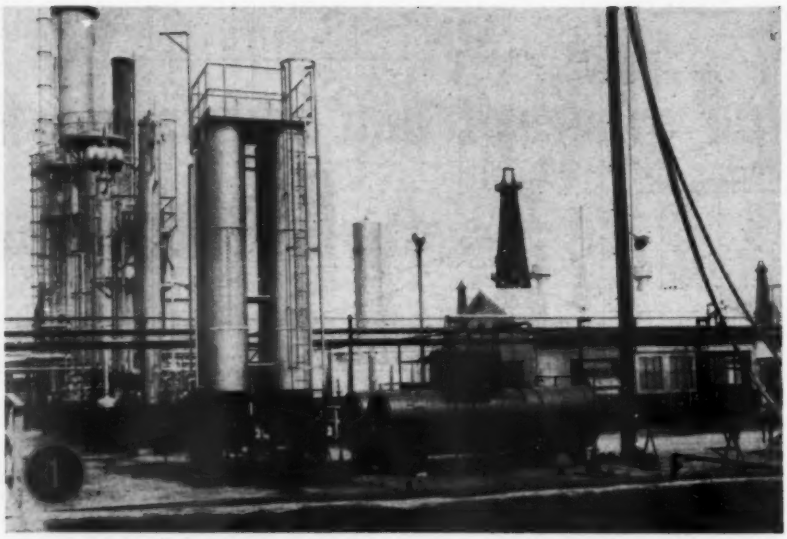
BOOKS

MOBILE RADIO HANDBOOK. First Edition. Edited by Milton B. Sleeper, Jeremiah Courtney, and Roy Allison. 190 pp. $2 paper, $4 cloth.

This book will be of interest to company executives and public officers responsible for the planning and purchase of communications equipment, as well as for communications engineers, system supervisors, operators, and maintenance men. The first three chapters cover factors which must be considered when planning mobile or point-to-point systems, frequencies and rules for each service, and proper procedure for filling out license application forms. Three succeeding chapters are devoted to the problems of selecting the right equipment for particular systems, with specifications on all equipment presently available. Two chapters are on antennas and towers, with special-purpose antennas described and photographic instructions for antenna-tower erection. Workable routines and sample record forms are given in a chapter on maintenance, with special emphasis on frequency-checking. Cost-per-mile figures for radio relays and wire lines, and various methods of multiplexing are presented in another chapter. The duties and license requirements for operators are explained. Mathematics has been avoided in a chapter on FM theory by the use of 83 charts and illustrations.

TABLE 1—STOCK TANK TEMPERATURES AND A.P.I. GRAVITIES ON FOUR REPRESENTATIVE LEASES WHERE CRUDE-OIL EMULSIONS ARE TREATED. (FLOW LINES TO SEPARATORS ARE BURIED)

Lease—	Oct. '47		Dec. '47		Feb. '48		Apr. '48		June '48		Aug. '48		Oct. '48		Dec. '48		Feb. '49	
	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.	Temp.	Grav.
No. 1	60	38.6	0	0	0	0	0	0	84	38.5	88	40.2	70	41.4	56	41.7	70	40.2
No. 2	72	38.5	68	40.2	0	0	60	39.2	88	38.7	81	37.4	70	39.6	40	38.7	56	39.1
No. 3	86	41.7	64	42.5	58	40.0	66	41.7	88	41.3	88	42.1	85	42.3	57	42.9	74	42.0
No. 4	90	41.5	68	42.0	60	42.6	70	41.2	84	39.9	90	41.6	70	41.0	42	42.5	36	42.5
Average	78	40.0	67	41.6	59	41.3	65	40.7	86	39.6	87	40.3	74	41.3	49	41.45	59	40.95



1. Acid-treating plant built by Fletcher Oil Co. at Wilmington, Calif., for color control of stove distillate. The four vertical columns in left foreground are acid scrubbers and caustic contactors. Horizontal tanks are for fresh acid and sludge.

Fletcher Treats Stove Distillate For Color Stability

REFINERS with a relatively small production of cracked stove distillate face a problem of color stability because of postwar competition from larger manufacturers who have extensive and elaborate treating equipment. This situation faced Fletcher Oil Co., Inc., of Wilmington, Calif., which operates a Dubbs cracking plant rated at 3,500 bbl. daily. However, the unit consistently is run at from 5,000 to 7,000 bbl. each 24 hours.

This plant produces only three products: gasoline, stove distillate, and industrial fuel oil. The cracked stove oil is produced at 400 bbl. daily to a boiling range of 400 i.b.p. to 570 e.p., with an A.P.I. gravity of 33.5°. The stream, as it is condensed and received in the accumulator, has a color of 1½. However, because of the unsaturates, it becomes darker rapidly until within a few days the color is 8 to 9 and almost black.

The above characteristic put the commodity definitely off the market and it soon became a major problem of disposition. Inquiries about and investigations of the various methods of treating disclosed that no process was economically available for the small refiner. Therefore, the laboratory personnel at Fletcher was told to "dig up a process."

A pilot plant was constructed as an experimental unit to use various reagents commonly employed for stabilization and control of cracked distillate colors. Sulfuric acid was decided upon as the most effective material for removing the objectionable unsaturates, which are the chief cause of unstable color characteristics.

The commercial plant consists of four vertical columns, 28 in. i.d. and 21 ft. high, piped for series operation. The first three columns are concerned with acid contact and scrubbing, while the fourth is a caustic tank for neutralizing the acidity of the treated product.

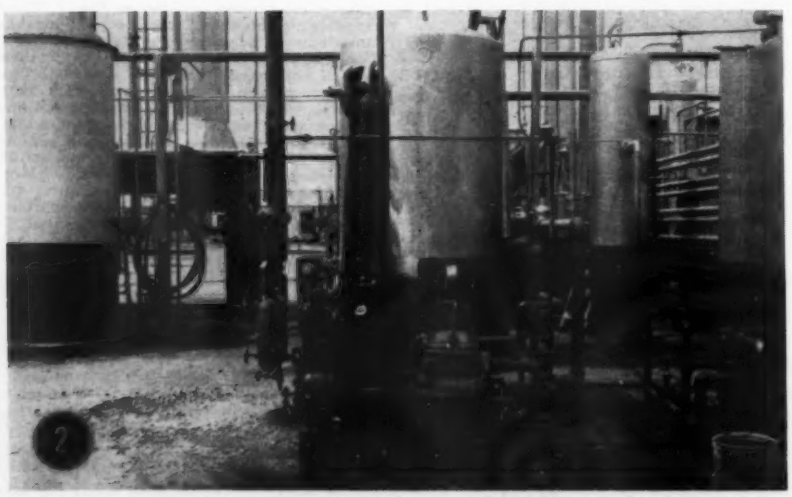
When this plant was first constructed, some of the findings uncovered by operating the pilot plant were disregarded since others in the industry advised the use of conventional equipment, such as turbulence contactors and the method of tower filling. First operation of the completed plant indicated that insufficient contact was established between the acid and the stove distillate. However, quantities of acid were much greater than first indicated in the pilot plant and over treating was the result.

No Channeling After Repacking

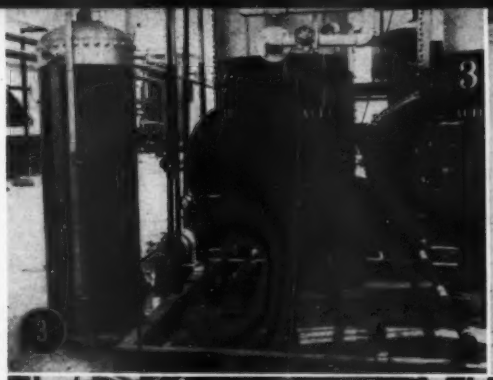
Channeling in the fully packed columns also was discovered shortly after the plant was placed in operation, and the unit was then shut down. The columns were emptied so the quantity of material could be gaged according to the first results of the pilot plant. All three of the columns on the acid side of the unit were then refilled by placing 1-in. Raschig rings to only the one-third level. This was followed by graded waste-glass rubble to a level which left the top one-third of the vessels empty. The fourth vessel, the one used for caustic contact, was filled full with graded glass rubble. After the repacking no channeling has been observed.

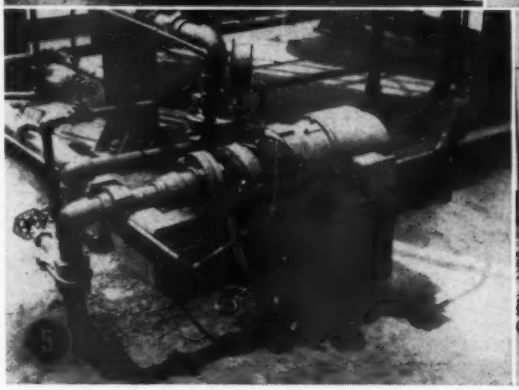
Contacting the stove distillate with 66° B. sulfuric acid is now accomplished with a centrifugal pump operating in reversed rotation. This unit is a Byron Jackson Bilton 2½-in. pump rated at 250 g.p.m. The charge to the treating plant is supplied with a 6 by 4 by 6 reciprocating duplex pump, controlled to deliver stove distillate to the treating plant at the manufactured rate, which averages 700 gal. per hour.

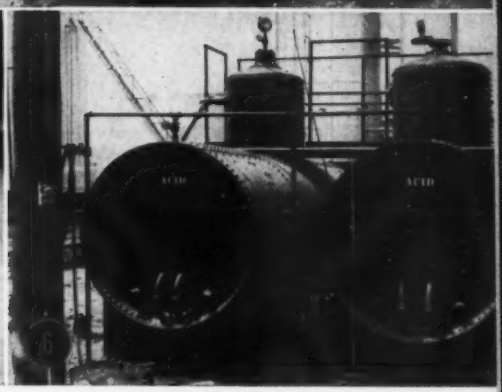
Instead of using a separate pump to handle acid as such, a small unit was shop made to pump the stove distillate into a drum, which operates as a displacement vessel. The



2. Stove-distillate accumulator and acid-treating-plant charge pump.







3. Acid feed tank at Fletcher's stove-distillate treating plant in refinery at Wilmington. 4. Six by four by six-inch reciprocating pump to charge stove distillate to acid-treating plant. In right foreground, in front of fluid cylinder, is the ¾-in. piston-packed proportioning pump. 5. This 2½-in. 250 g.p.m. Byron Jackson "Bilton" centrifugal pump is arranged to run backward, serving as acid and charge turbulence contactor in the stove-distillate color-control plant. 6. Two horizontal return-tube discarded boiler shells are employed as tanks at the acid plant. Right shell is for acid sludge, and left for fresh acid storage.

stove oil is discharged into the closed tank so that an equal volume of acid is discharged under pressure into the suction of the reversed direction centrifugal pump.

The aforementioned small "proportioning" pump is made with a ¾-in. barrel, or cylinder, equipped with a stainless-steel plunger, packed on the one end. The opposite end is both suction and discharge, which branches to suction and discharge piping fitted with check valves to control the flow of liquid through the pump. This little unit is attached to the stove-distillate charge pump with brackets for quick removal if necessary. Length of stroke is governed by a threaded extension of the plunger, which is fitted with adjusting nuts. Drive for the proportioning pump is by linkage with one piston rod of the stove-oil charge pump so that the speed of both pumps is the same regardless of the amount of stove oil delivered to the treating plant.

With the centrifugal pump rotated for reverse operation, it constantly attempts to pump back into the discharge of the treating plant charge pump, resulting in maximum turbulence in the impeller case. Acid enters the piping of the centrifugal pump at the inlet connection so that the stove distillate and the acid are subjected to the greatest amount of mixing.

Almost complete separation between the commodity and the resulting sludge occurs in the base of the first packed column from which it is drawn frequently into the sludge receiver. Both sludge receiver and the fresh acid storage are made of discarded horizontal return tube boiler shells (with tubes removed).

The stove distillate flows in series through the first three columns so that all traces of acid sludge may be separated from the product before it enters the fourth column for neutralization. This vessel contains a charge of 250 gal. of 20° B. caustic through which the stove distillate passes toward the top. From there it is piped to plant storage.

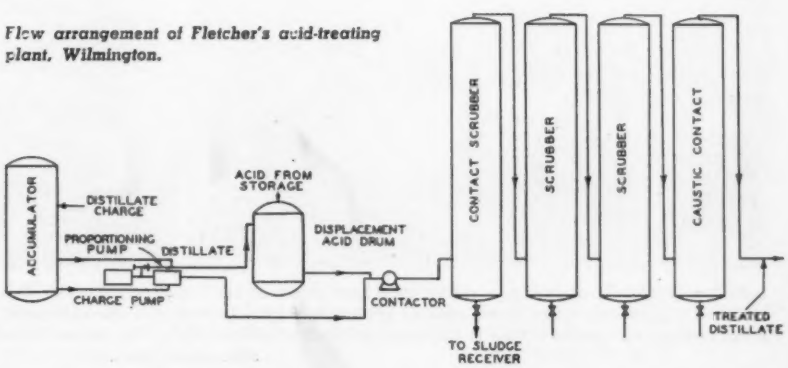
The stated quantity of caustic has been found to neutralize approximately 1,000 bbl. of stove oil, and is discarded when spent.

When the acid displacement drum is almost filled with stove oil, pressure is applied to the acid storage so that it acts as a blow case. A line is opened on the displacement drum to permit stove distillate to flow into the centrifugal pump intake so the acid can be transferred into the drum for continuous use.

Two main points of interest are to be found in the stove-distillate treating unit, and, according to L. A. Hulsey, general superintendent, are the reasons for successful treating of small quantities of this cracked product for color stability. These points consist of (1) means of displacing acid with stove distillate instead of direct pumping and (2) method of creating extreme turbulence in the stream of stove distillate and the treating acid for a minimum time contact. The result is a low rate of polymerization; only about 135 gal. of sludge per day being formed by the acid when treating 400 bbl. of product.

Continuous operation of the plant for the past year indicates that chemical treating costs are about $0.0475 per barrel of material pumped through the plant. Test for color stability consists of exposing samples to an oven temperature of 212° F. for 24 hours. These tests are said to equal the time element for distillate stored in closed tanks for as long as 9 months. Colors of the treated product after the test showed a degradation of only one-half point; 1½ color material came out at 2.

Flow arrangement of Fletcher's acid-treating plant, Wilmington.



XUM

Use of Solid EXPLOSIVES IN WEST TEXAS

by Roy F. Carlson
Dallas District Editor

THREE new solid explosives are being widely used in oil-well shooting, particularly in tight sandstone formations in the Permian basin. Results with these explosives indicate that they are safer, just as effective, if not more so, and more economical over-all than is nitroglycerin.

Description

Two of these explosives are in the form of 1-ft.-long cylinders wrapped in waxed paper containing one wrap of aluminum foil for moisture protection in storage. They are cast in this form in manufacture and used in this form in shooting a well. Each of these cylinders has a thin-walled (1/64-in.) aluminum tube running through its center.

These two solid explosives have the appearance and approximate compressive strength of weak concrete. They are rather dense and heavy, having specific gravities of 1.5 and 1.7. They are labeled S.O.W.E. No. 1 and EL-431-A by the manufacturers, the American Glycerin Division of E. I. du Pont de Nemours & Co. Two are manufactured in several diameters, but each size has a block length of 1 ft. The corresponding quarts per foot of bore hole are: 2½ in., 1 qt.; 3 in., 1½ qt.; 3½ in., 2 qt.; 4 in., 2½ qt.; 5 in., 4 qt.; 5½ in., 5 qt.

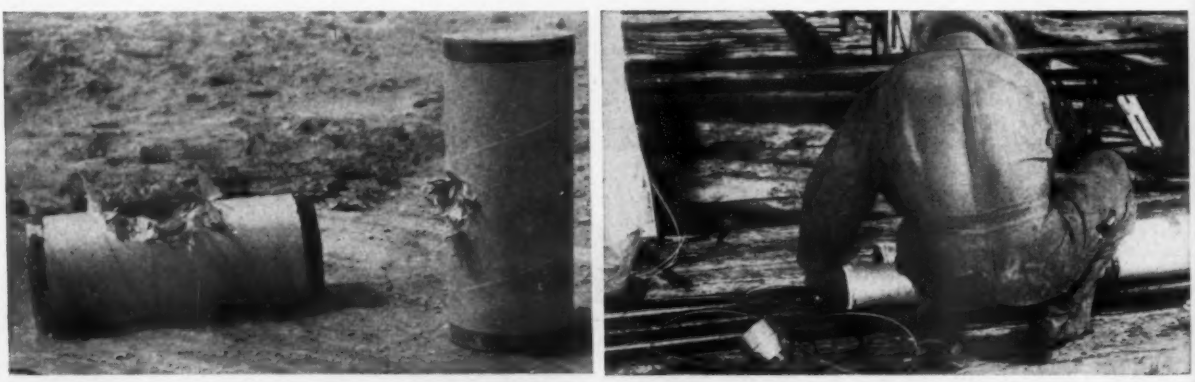
The third explosive, labeled S.O.W.E. No. 3 (Special Oil-Well Explosive No. 3) is a new explosive developed recently that has a specific gravity of 1.4 that can be used safely in deep, hot wells where it would be dangerous to use a nitroglycerin-type explosive. This explosive is similar in action characteristics to nitroglycerin; that is, it is a very high-velocity explosive, in fact somewhat greater than nitroglycerin. It can be used safely in temperatures up to 325° F. and is not affected by any static pressures found in oil wells. This is a relatively expensive explosive and is not recommended except where it would be dangerous to use the other slower explosives.

Safety

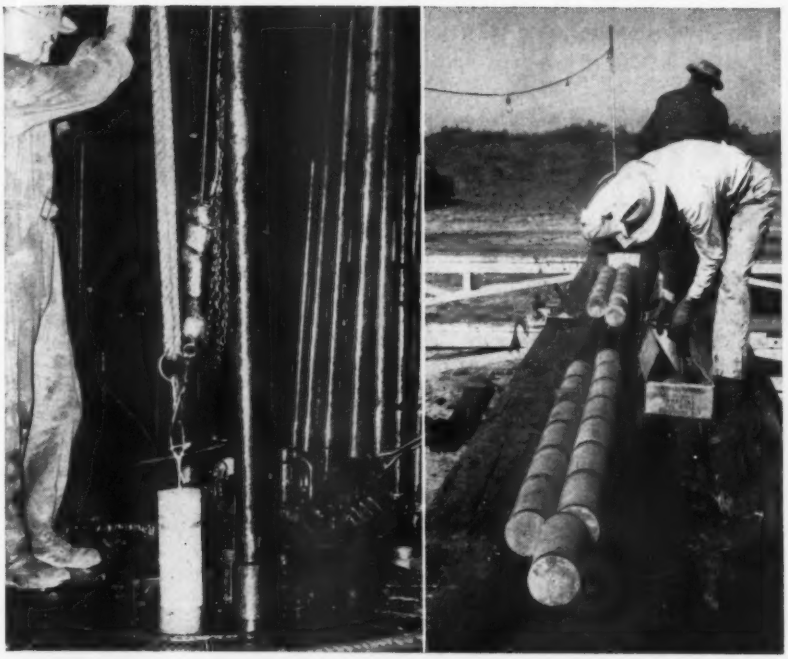
These three new solid explosives are quite similar in characteristics, the EL-431-A being somewhat slower in the rate of pressure development and containing approximately 15 per cent more explosive per quart. As stated before, it has a density of 1.7 as against 1.5 for S.O.W.E. No. 1. The following description deals primarily with S.O.W.E. No. 1 and EL-431-A. They are much safer than either liquid or solidified nitroglycerin. They are much more insensitive to impact or friction, and can be beaten, chopped, hammered, dropped, sawed, or hit by a rifle bullet with good assurance that they will not detonate. In several instances they have been drilled up successfully with both conventional rotary and cable tools. However, it must be borne in mind that this material is an explosive and such procedure should only be used as a last resort.

Also, because of its insensitive nature it can be prepared for insertion into a well much more rapidly than nitroglycerin. The manner of make-up of a shot makes it unnecessary to

The time bomb consists of two clocks shown at left, a plunger arrangement shown in the center, and a primer charge of RDX shown at right. This assembly is enclosed in the pressure-tight metal tube shown behind the bomb's working parts.



Left: The two blocks of explosive shown here have been hit by 30-cal. rifle bullets. One of each of two kinds of new solid explosives has been hit, with the effect shown, and no explosion. Right: A section of the shot string is being prepared here. A stranded wire line is run through an aluminum tube in the center of each explosive block. The bottom of each section is fitted with the small metal guide shoe shown here.



Left: A section of the shot is being lowered through the rotary table here. Another section of the shot will be fastened above this one by means of the bail shown, and the two lowered into the well. Right: Here several blocks of the explosive are being lined up, preparatory to stringing on the wire line. Joints of drill pipe serve as a guide.

tamp or pour the explosive into shells. It provides a much greater degree of safety for personnel both on the rig floor, as well as during transportation to the well. It is transported in pickup trucks in cartons of four blocks each. The explosive will not give the user a headache as will nitroglycerin. It is difficult to ignite and will usually burn slowly when ignited.

Use

The shot is run in sections much the same as is nitroglycerin. The sections of this new explosive, however, are prepared on the walkway below and in front of the derrick V-door and are hoisted into position in the kelly bushing by the derrick cat line in semirigid sections of several blocks each.

In the run witnessed by the writer, two 16-block sections were lowered at one time. Each of these sections contained two additional small primer blocks of another explosive that is also relatively insensitive to impact. These primer blocks are used to assure complete detonation of the explosive, acting as relays or boosters for the explosive wave as it travels along the explosive string.

The blocks in the sections are prepared for running into the well by stringing them on a ⅛-in. stranded airplane-wire line. This line is run through the aluminum tube in the center of the blocks. A small tinned-metal guide shoe is fastened to the line on the bottom of each section to act as sort of a nosepiece and guide each of the sections past casing joints or other places in the hole where the sections might possibly hang up.

In this photograph, 30 blocks of the explosive are strung together to be lowered into the well. The metal trough in the foreground was used to line up the blocks before stringing on the wire line.

A metal-wire bail is fastened at the top of the stringing wire in each of the sections. The bail of one section is fastened to the shoe of another section to form the two-section units that are lowered into the well. These units are lowered to the bottom by a small winch and a 5/32-in. wire line. The shot units are attached to the line by a small slip hook that disengages when the shot comes to rest at the bottom of the hole.

The units of the shot are lowered into the well, disengaged from the slip hook, and rest one upon the other until the assembly of the shot is completed. The last shot unit contains the time bomb that initiates the explosion. The usual bomb contains two independently acting clocks, either one of which can initiate the explosion.

The bomb is the usual kind used with nitroglycerin and consists of a trigger-and-spring actuated plunger with two firing pins for each clock. The initiator section consists of the primer and case of two 22-caliber Hornet cartridges per clock. A No. 8 blasting cap is fitted to each of the cartridges, and these in turn fit into holes in a primer charge of RDX—a powerful explosive that possesses sufficient explosive strength to initiate detonation in the main portion of the shot.

As with older kinds of explosives, these shots are usually made with a gravel tamp and a short section of Cal-Seal above the shot to contain the explosion gases to the desired section of the hole.

Since these explosives are solids and have quite high compressive strengths, and remain so at usual bottom-hole temperatures, and are made up in rather long semirigid strings, the shot tends to remain in position along the length of the section to be shot.

Explosive Action

As compared to the older nitroglycerin types used in oil wells, these new explosives have a lower rate of pressure development. This does not mean that they are weaker, but rather that they develop their maximum pressure over a slightly longer period of time, a rather new concept of explosives as applied to oil-well shooting.

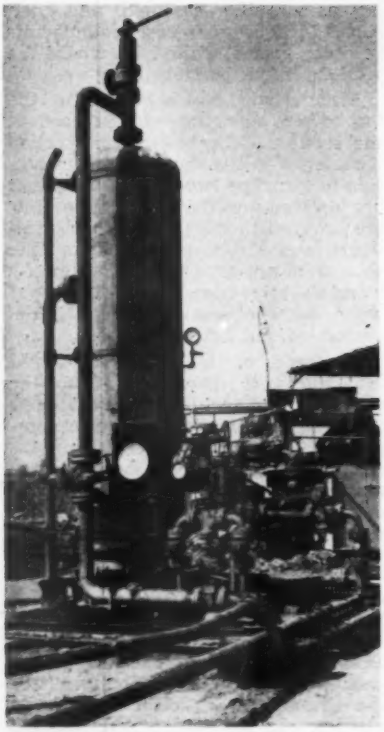
This rate of pressure buildup can be likened somewhat to the explosion of gasoline in a cylinder of a car. When the burning occurs too fast, the motor knocks and some energy is wasted, but by the addition of retardants the combustion rate is made more even, thus developing maximum power.

As a result, although the mechanics are not fully understood, the explo-

(Continued on page 76)

XUM

Unitized Test Separator Is Always Ready for Use



Separator setup used by Richfield for measuring oil, water, and gas on newly completed well.

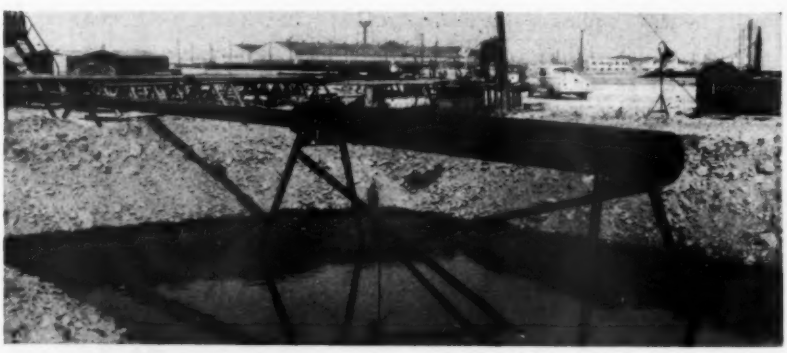
RICHFIELD OIL CORP. has designed an oil and gas separator setting which need not be disassembled each time it is removed from a newly completed well, nor time consumed by rigging up a new installation when ready for another flowing test. The entire setting is mounted on an all-steel substructure, floored with open-mesh grating for operators to walk upon when inspecting the instruments and valves.

The 3 by 10-ft. 2-in. separator has a working pressure of 250 psig. The skirt is attached to the sills of the substructure with bolts. Only three connections are necessary to place the separator for operation. The lead line from the well is attached to the separator assembly with one lug-type union. The line conducting the gas to the stack is attached in a similar manner, and the piping which is to carry the oil to tanks, or a sump, is likewise made up.

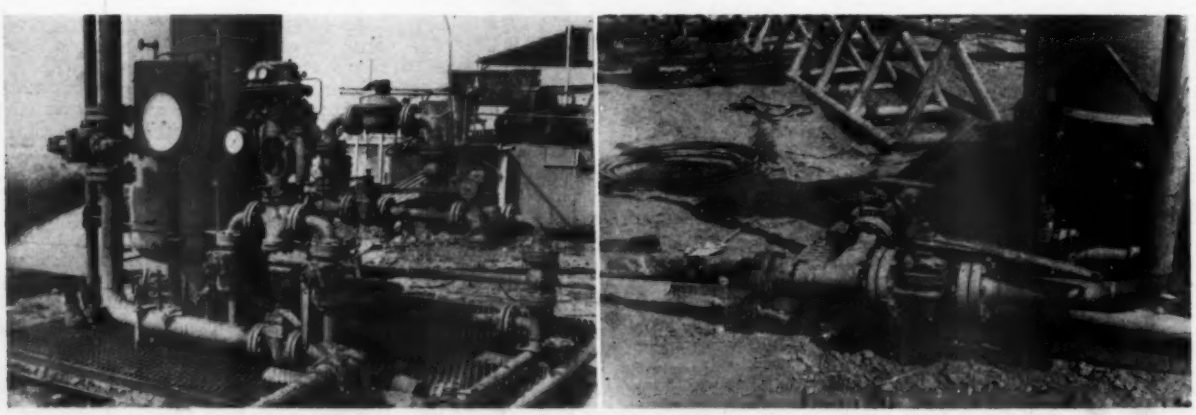
Piping to carry the gas from the separator is placed as close to the vessel as practicable and brought downward with a 4-in. retractable orifice fitting. A back-pressure controller is connected down stream from the meter setting, fitted with a bypass to vent the gas directly to the flare without pressure control if necessary. Fluid leaving the separator through the self-contained liquid-level controller is measured with a 1½-in. liquid meter. This also is installed with a a bypass below the mounting.

All piping required for the separator setting is carried on the substructure and ends at the boundary of the foundation. Therefore, all connections are made at the setting without cutting pipe for this purpose, when the separator is installed for a flowing test. Base of the substructure contains four wide sills so the unit can safely be set on any type of ground surface. It also can be cribbed with timber mats during the rainy season to support the weight without shifting.

So the unit can be loaded and unloaded fom a truck, a skid-type frame is attached to one side of the separator with wraparound ties. This attachment is included in the design so the setting can be laid down flat on the bed of a truck without damage to any of the instruments and fittings, and likewise unloaded at the well to set upright with a minimum of time.



Spray dampener mounted over pit, to prevent oil from being sprayed over surrounding area.



Left: Arrangement of equipment on test separator at newly completed well of Richfield Oil Corp. in East Los Angeles field. Note retractable orifice fitting, recording orifice meter, pressure controller, and liquid meter. Right: Inlet connection for test separator requires only one fitting to attach setting to well flow line.

HOW THEY'RE SAVING SPACE AND CUTTING COST AT GUYMON WITH COOPER-BESSEMER GMW'S

Above: Five of the Cooper-Bessemer GMW engine-driven compressors in Michigan-Wisconsin Pipe Line Company's Guymon-Hugoton Station, showing units from scavenging, blower end. Each has 10 V-type power cylinders, is rated 2500 hp, and drives 3 compressor cylinders.

Shown above are five of the Cooper-Bessemer GMW V-angle compressors now at work in the new Guymon-Hugoton Gas Field Station of the Michigan-Wisconsin Pipe Line Company.

Despite the relatively small space they occupy, these five units alone provide a total of 12,500 compressor horsepower! It shows that *big* savings can be made today in the cost of foundations, buildings and installation by taking advantage of the extreme compactness, the high power-to-space ratio of these modern V-angles.

But of course that's not all. By meeting power needs with fewer, more compact units, there's also a sizeable, long-range saving in maintenance, personnel and overall operating cost. What's more, years of field experience prove that you can always count on Cooper-Bessemer V-angles—GMW's, GMV's, and GMX's—for continuous compressor performance at its trouble-free best.

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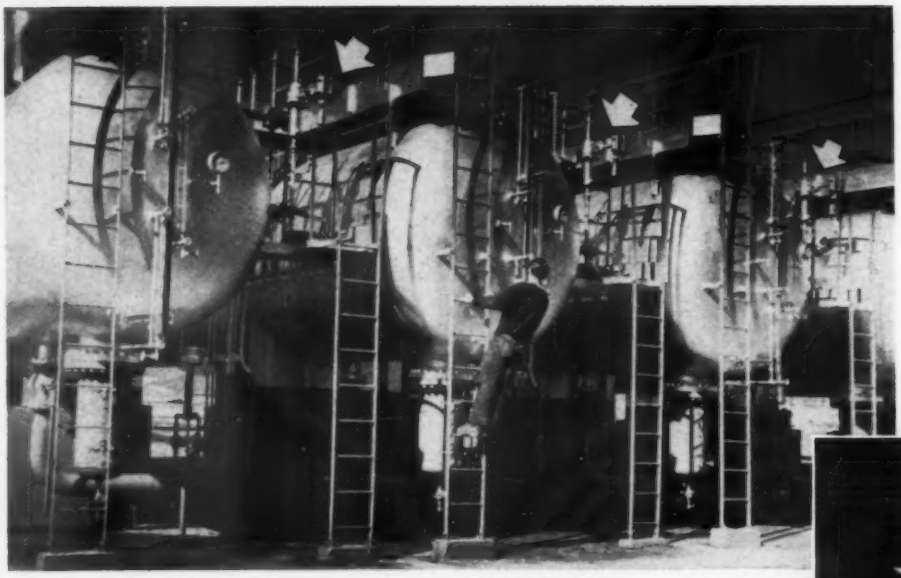


Left: Liquid-level controllers (see arrows) afford positive assurance against overfilling L.P.G. storage at Barnsdall Oil Co.'s Newhall, Calif., gasoline plant. Drawing and inset photo, below, give further details of installation of the liquid-level control system.

Instrumentation

of process equipment and tankage prevents spills and overfilling

WHEN Barnsdall Oil Co. designed its Newhall, Calif., gasoline plant, it was the goal of company engineers to equip the processing columns and storage tanks with instruments which would not only protect the investment, but would also offer a high degree of safety for the employes in the plant. Therefore, a greater number of liquid-level controls and recording instruments was installed than usually observed in the average plant of this nature.

Plant Operation Features

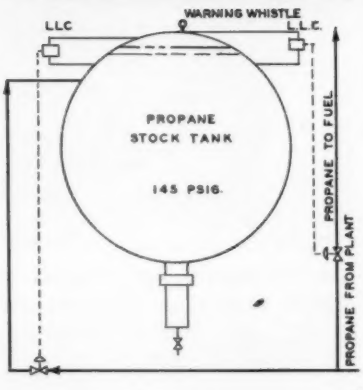
The function of the Newhall plant is to gather casing-head and field separator gas for the recovery of marketable gasoline fractions, and to return the dry residue gas at about 2,000 psig. for pressure-maintenance operation of Newhall-Potrero oil field. The composite load of produced gases contains large quantities of both propane and the butanes which are fractionated from the raw production in one pass without additional rectification to produce commercial grades of liquefied petroleum gases. The rich-oil deethanizer unit removes methane and ethane before the higher-boiling components are distilled from the rich absorption oil.

Two fractionators are operated to cut the raw-gasoline production into the desired fractions. The first in line produces propane overhead under total condensation. The bottoms, therefore, are a composite mixture of butane and heavier which travel in sequence to the second column where the butanes are recovered from the overhead and totally condensed, leaving the bottoms of this column as natural gasoline of the desired composition and vapor pressure. The three major products are condensed and cooled and released through appropriate pipe lines to pressure storage.

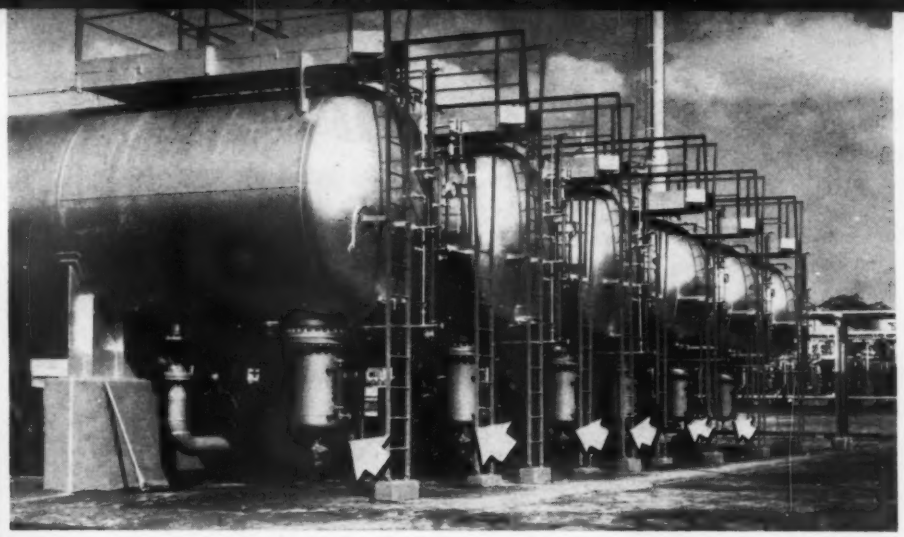
Two similar installations handle the propane and butanes. Both are automatic in operation and contain a number of indicating and recording instruments to show and maintain the flow and several liquid-level controllers which protect the plant and storage tanks. Following through with the propane operations, the fractionated propane emerges from the top of the column and is carried through a vapor line which leads to a shell-and-tube product condenser to liquefy all of the overhead before it enters the propane accumulator drum. This process operates automatically so long as an outlet is available for the condensate, and no obstruction enters into the transfer of the product from the accumulator.

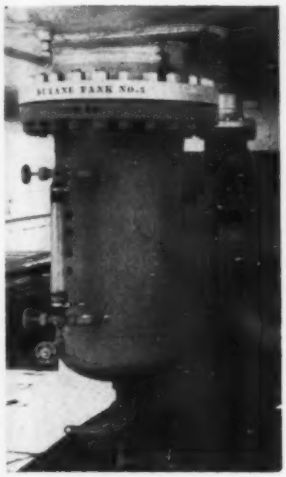
Special Hookup of Tankage

Tankage which receives the propane consists of three identical horizontal vessels set in company with three similar tanks which are designed to contain butane. Both groups form a single setting, and under certain conditions either of the group may be operated for propane or butane as the necessity arises. The propane tanks, for example, are fitted with double safety valves which release vapors to the discard stack, should all equipment fail to operate on schedule. The vessels are engineered to contain only a certain quantity of products so as to leave a predetermined outage in a filled tank. To accomplish this operation, each tank has a twin setting of liquid-level controls. The first is the work-

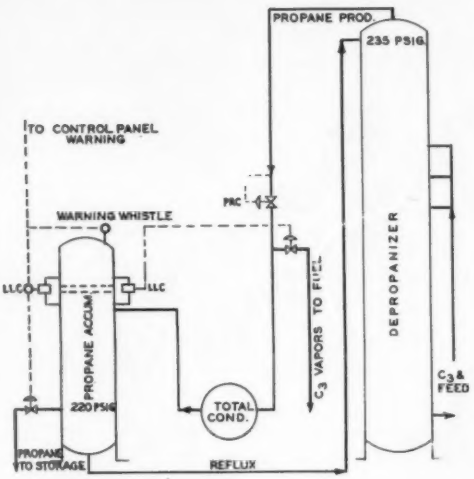


Another interesting feature of the L.P.G. storage is the combined manway cover and water leg at the bottom of each tank (see arrows). Small photo shows additional details.





Right: Note the two liquid-level controllers on propane accumulator. The left-hand one operates first, shutting off propane flow to storage, and setting off warning whistle and signal to control panel. Right-hand controller is mounted slightly higher; if this one operates, C_3 vapors are released from depropanizer to fuel system instead of continuing through condenser to propane accumulator.



ing instrument which remains open as long as the tank is filling, but only up to the predetermined level. As soon as the propane reaches this level, one instrument starts a train of operations for closing the transfer line, the other releasing plant air into a warning whistle. Closing of the transfer-line valve is not immediate, but only a short time elapses until the level in the tank reaches the high level when the transfer line closes completely.

While the valve is in the process of being closed, the level in the reflux-accumulator tank has built high enough that its liquid-level instrument begins to function, and also starts a train of operations that result in the opening of another remote valve on a line branching from the depropanizer overhead vapor line ahead of the condenser and leading into the plant fuel system.

The plant fuel system is under about 30 psig., so that this pressure is low enough to keep the propane in a gaseous phase in the fuel system.

To supplement these operations, additional instruments are installed on the accumulator drums at the depropanizer, or propane rectifier. A similar engineering design to that installed on the storage tanks is applied at the accumulator drum. One liquid-level control instrument is connected to the top of the accumulator to control the level built up in this vessel. The liquid-level controller actuates the outlet valve on the accumulator in the product line leading to the storage tanks, and so long as the liquid level remains at or above the predetermined line, the outlet valve remains open.

However, should the liquid-level instruments on the tank begin to shut off the flow to a point below the amount of liquid flowing from the accumulator, the liquid-level controller starts its train of operations and opens a shut valve on a bypass line between the back-pressure valve on the vapor line and the product condenser. Vapors are released through the opening valve to the plant fuel system as uncondensed product.

Connected to the operation of a high-speed liquid-level alarm is a mechanism which vents plant air into a warning whistle to notify the operator that all lines are not clear. In this manner, the plant operators are notified at the storage tanks and at the fractionator so that ample time is permitted for switching tanks or correcting the difficulty if elsewhere.

While the butane-storage tanks and processing equipment, together with the accumulator drum, are supplied with instruments similar to those in the propane system, the emergency liquid-level controller on the butane tanks releases excess liquid to the plant flare. The emergency liquid-level controller on the accumulator tank, however, releases the uncondensed butanes into the plant fuel lines.

Combination Manway and Water Leg

Not connected with the liquid-level controllers, nor with other instruments, is an idea applied to all storage tanks in this gasoline plant. Instead of installing pressure storage with the manway in the conventional position on top of the tanks, these manways are connected to the bottom of the tank near the control end. The flanged manway openings are fitted with large pots which can be removed by unbolting the companion flanges so that an inspector can look into the vessel without climbing down into a more or less hazardous condition. These pots serve as water-condensate traps so that any accumulation may be bled away before entering the pumping-out lines.

During the 18 months or so that the Newhall plant has been in operation, these automatic instruments have never been called upon to function except to test them, states Melroy Welch, Los Angeles, manager of the gas department of Barnsdall. Operation of all safety and emergency equipment is checked periodically by intentional closing of valves, or by permitting a tank to fill above the first, or normal, level, so as to be sure that the safety equipment will readily function should conditions prevent an operator from switching tanks.

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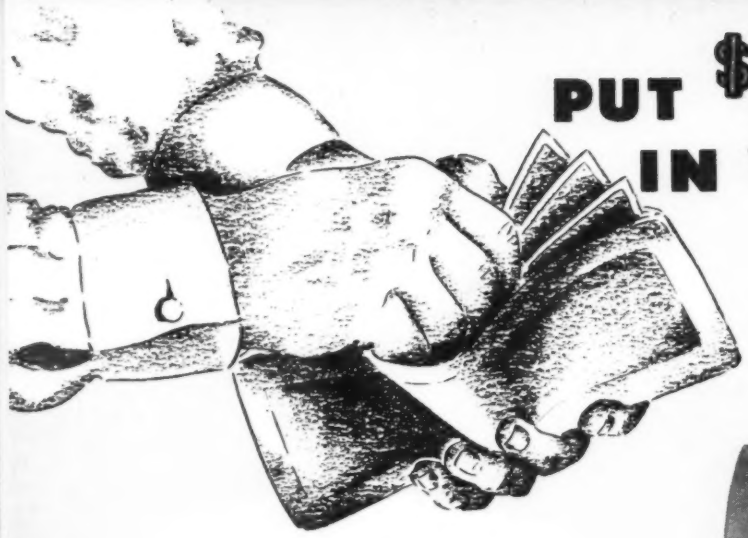

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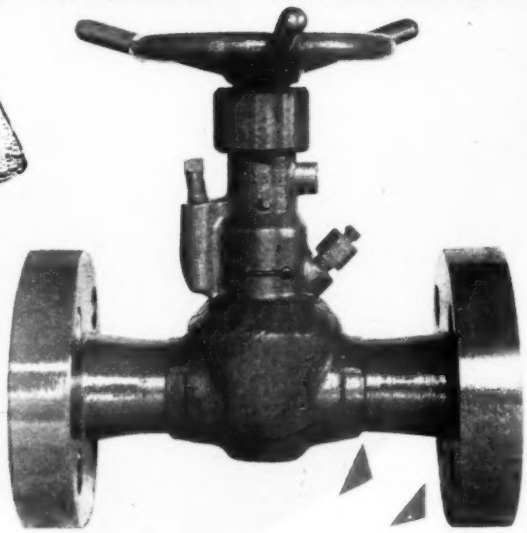

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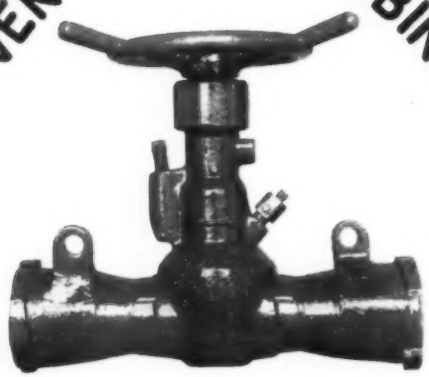

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Principal Factors to Be Considered Prior To Recommending Expenditures for

WELL REMEDIAL WORK

. . and Evaluation of Expected Results

by W. B. Hopkins

W. B. Hopkins was appointed chief petroleum engineer, Houston district, Gulf Oil Corp., March 1, 1949. Hopkins was a 1939 graduate of University of Texas, with B.S. degree in petroleum engineering. He entered Gulf employ in March 1940 as a petroleum engineer with Mene Grande Oil Co. and worked in the Lake Maracaibo district for 3 years before entering military service. He volunteered for Seabee duty in 1943 and participated in the invasion of France. After his discharge from the Navy, Hopkins returned to Gulf as a petroleum engineer, working in Louisiana, Mississippi, and as division petroleum engineer at Houston.

THE first factor to be considered prior to recommending expenditures for well-remedial work is the production performance of the well and the reservoir in which it is completed. The production performance not only has to be considered at the time the well goes off production, but it has to be watched and studied during the entire producing life of the well. It is of utmost importance that frequent and accurate production tests be obtained and recorded, because this information is essential in the planning of workovers.

Oil, gas, and water-production data together with reservoir pressure measurements form the basis for reservoir-performance analyses. These studies frequently indicate desirable remedial operations that otherwise might be overlooked. For example, a well may be producing oil at quite a profitable daily rate, but it may also be producing an excessive amount of gas or water. Although the well itself is producing profitably, the harm it is causing the reservoir by its excessive production of gas or water may be of such an extent that it would be advisable to workover or even close in the well.

Reservoir studies may also result in early recognition of the recovery mechanism of the reservoir with the consequent saving of unnecessary or unsuccessful workovers. For example, the early recognition of a dissolved-gas type of reservoir, only, can well result in the saving of a useless workover attempt to lower ratios by squeezing with cement and reporforating, because in this type of reservoir the increasing gas-oil ratios are due to gas coming out of solution within the reservoir. No amount of squeezing will reduce the ratios.

Geological Records Important

Access to geological records is just as important as access to production records. Electric logs together with core descriptions, drill-stem tests, and production data, are very useful in planning workovers. Contour maps and sand thickness maps often are of great help in showing why a well behaves as it does and whether a workover is practicable.

Electric-log cross sections are of value in showing the gas-oil and water-oil contacts in relation to the producing interval. Also, they are of value in showing lensing and lateral and vertical changes in permeability, and in explaining seeming incongruities within the reservoir.

The second factor to be considered prior to recommending an expenditure for well remedial work is the work necessary to restore the well to production. This factor can be broken down into three general categories: (1) Recompletion in the same reservoir from which now producing; (2) recompletion in a reservoir penetrated by the well and cased off; (3) recompletion in a deeper reservoir by deepening operations.

In considering recompletion in the same reservoir, the amount of oil that has been taken from that reservoir must be known as well as the probable future recovery.

Often the work necessary to restore production from the same reservoir is of a mechanical nature. For instance, the well might have a plugged screen. This difficulty can sometimes be corrected by running a screen washer or screen shots at a cost of only a few hundred dollars. On the other hand, the screen may be cut out and the well sanded up, and it would therefore be necessary to pull the screen and reset a new one at a possible cost of several thousand dollars.

Other difficulties not of a reservoir nature sometimes encountered are paraffined tubing and, in some areas carbonate scale deposition in the tubing and flow line. In areas where paraffin troubles are encountered, the procedure usually is to scrape tubing at regular intervals to prevent plugging. Also, coating the inside of tubing and flow lines with a plastic has proved effective in preventing deposition of paraffin.

In some areas, wells have a tendency to deposit carbonate scale in the upper part of the tubing and flow lines and are usually those producing large volumes of water. Removal is usually effected by treatment with acid at a very nominal cost.

Other mechanical repairs that are sometimes necessary are due to casing and tubing leaks and bad liner or casing cement jobs in which there is migration of gas or water behind the pipe.

Artificial Lift

Finally to be considered in the way of mechanical repairs is the equipping of wells for artificial lift. The two conventional ways of artificially lifting are of course pumping and gas lifting. Before deciding which method of lift is to be installed, the availability of gas must be investigated and the adaptability of the well to each of the methods must be considered. Normally, a high-volume, high-fluid-level well, such as one that must produce several hundred barrels of water per day to recover a moderate amount of oil, is better adapted to gas lift; while a low-volume, low-fluid-level well is better adapted to pumping.

When gas is available and gas lift desirable, it is wise to make certain that gas is available in a sufficient volume and at a sufficient pressure to maintain gas-lift operations over a long period of time.

Frequently it is desirable to utilize both gas lift and pumping in the same field. In one of our fields where we are at present using gas lift almost entirely, we have only one gas well from which to obtain gas-lift-gas, and we have no assurance at this time of any additional gas supply. This well, although a good one, is declining in pressure, and if we continue to put all wells requiring artificial lift on gas lift, we will overload our system and

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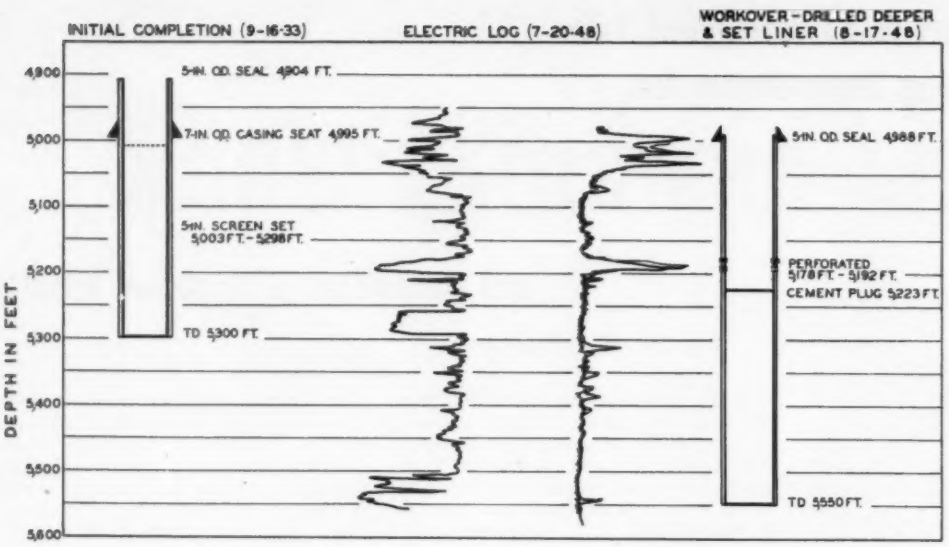
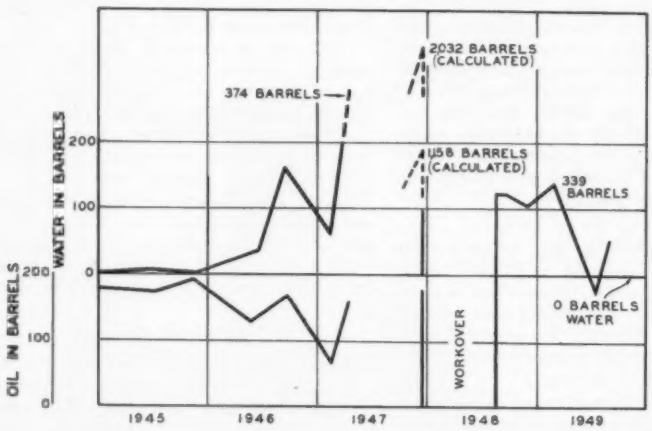


Fig. 1—Diagram of the casing setting and original screen setting of a Gulf Coast well. Also included are the electric log and data for subsequent workover operation. Chart at bottom shows the oil and water production history before and after workover. Before the workover the well was flowing 301 bbl. oil and 500 bbl. water daily, although suddenly it went to 97 per cent salt water and stopped flowing. After workover production of 325 bbl. of pipe line oil per day was secured and the well continues producing pipe line oil at its top allowable rate.



cause a reduced efficiency and a considerable expenditure in respacing valves currently in wells.

Fortunately, there are a number of wells in the field that are now on gas lift but which would be adaptable to pumping. As valve changes are required in these wells the gas-lift operation will be replaced with pumping equipment, and as wells in the future require artificial lift this situation will be given every consideration.

Plugging Back

On occasions it is desirable to plug back wells in the reservoir from which they have been producing in order to reduce or shut off water production. A careful study must be made of the well and the reservoir before such a recommendation is made, because frequently the oil is being produced from the same permeable section of sand as the water, and as a result of the plug back, both the oil and water production from this permeable section would be shut off, leaving oil in the reservoir that could have been otherwise produced. On the other hand, if another well is located favorably up dip to recover the oil from the section being considered, and the reservoir has a good water drive, it might be desirable to plug back the section in order to prevent having to lift large volumes of water with the oil. Also, if the water drive is only a moderate one, it might be desirable to shut off the water production so that the water drive can be used to greater advantage on other wells.

In a reservoir of the type where oil and water are both being produced from the same permeable section, frequently the well is completed through an additional section capable of producing oil, but which is not doing so because of its lower permeability. After the more permeable section has become uneconomical to produce, it can be plugged off, and sometimes a good well can be made from the less-permeable section.

Gulf Coast Well

Fig. 1 shows a diagrammatic sketch of the casing setting and the original screen setting in a well completed in the Gulf Coast area. Also shown in Fig. 1 is a tracing of the electric log and perforated interval after the well was worked over by pulling screen, drilling deeper from 5,300 ft. to 5,500 ft., running electric log from casing seat to total depth, and setting and cementing a liner and selectively perforating from 5,178 ft. to 5,192 ft. Fig. 1 also shows the oil and water-production history of the well.

This well was drilled in 1933 before the running of electric logs had become common practice. It was completed by the more or less standard method at that time of setting casing above the oil sand, drilling into the sand, and setting a wire-wrapped screen in open hole. The screen (Fig. 1) extended through a distance of 295 ft. from 5,003 to 5,298 ft.

The well produced pipe-line oil from the time of its completion to October 1945 when it first began making water. The water percentage gradually increased until April 26, 1948, when the well logged up and died. A short time prior to the date it died, the well was flowing at the rate of 301 bbl. per day oil and 508 bbl. per day water, or 63 per cent water, and the salt water increased to 97 per cent at the time the well stopped flowing.

It was worked over in the manner outlined above and was put back on production August 14, 1948, with an initial production of 325 bbl. per day pipe line and is to this date producing pipe-line oil at a top-allowable rate. Salt water is indicated (Fig. 1) by the electric log from 5,255 to 5,290 ft. This, plus the fact that it is making pipe-line oil after having been selectively perforated from 5,178 to 5,192 ft., rather clearly indicates that production from the well prior to the workover was coming from the section 5,255 to 5,290 ft.

Again, a study of the well and reservoir might indicate that the reser-

voir from which the well is producing is quite a thick section with uniform permeability throughout and with a water level that is rising uniformly. If the well is completed low in this section, when it starts producing water at an excessive rate, the water can be effectively shut off with no loss of recoverable oil by plugging back and completing higher in the section.

Recompleting Lower in Reservoir

It is sometimes desirable to recomplete a well lower in the same reservoir from which it has been producing. This generally is done when a well is originally completed rather high in the reservoir, and due to expansion of a gas cap, the well later goes to a high gas-oil ratio. By recompleting lower in the reservoir, the high gas-oil ratio well can frequently be restored to production as a normal ratio well, particularly if there is a shale break below the gas-oil contact and the well is recompleted below it.

Wells are also sometimes completed lower in the same reservoir in order to reduce or eliminate water production. An example of this is the East Texas field where numerous wells have been completed lower and water production has been eliminated. In certain areas in the East Texas field there are shale lenses in the producing reservoir which lie somewhat at an angle to the sand bed. It has been found that when the water level of the field reaches the lower end of one of these shale lenses, it often will rapidly migrate up the plane of contact of the shale and sand, and flood out wells that have been drilled in the area. Production of clean oil has been restored from many such wells by drilling through the shale lens, cementing liner, and perforating below the shale.

As a general rule, when a well is drilled, it is customary to complete it in the lowest productive sand. As a consequence there are frequently productive sands penetrated by the well that are cased off, and no attempt is made to produce these sands until the lowest sand or the one initially completed in has been depleted. In wells drilled some years ago, the failure to protect these upper sands, either because of lack of sufficient cement or because of a poor cement job, has left the sand face exposed for years to the annulus mud. In some cases the unprotected sands have been free to dissipate their energy to lower-pressure sands or to be contaminated by water from higher-pressure water sands. For this reason, workovers to sands that have not been adequately protected are often disappointing.

Accurate Depth Measurements

Accurate depth measurements, both original and present, are of great importance in recompleting from one zone to another, because without them perforations can easily be made in the wrong place, entirely missing the section in which completion is intended.

Many of the older wells were cased without an electric log having been run. Identification of zones in wells of this type depends upon drillers' logs which are sometimes not too clear. Gamma-ray and Neutron curves are of great value in more clearly defining these zones and sometimes picking up zones that were not noted on the driller's log.

In cases where electric logs have been run, a combination of Gamma-ray and Neutron logs will almost always be found to be adaptable to correlation with electric logs. These correlations, when used in conjunction with collar locators or other positive reference points, greatly reduce the possibility of error in perforating a new sand.

As a rule, less data upon which to base a decision are available when attempting completion in an upper sand than when recompleting in the same sand, and as a consequence, there is a greater chance of being wrong.

Often the first wells in a field are bottomed short of a deeper but undiscovered producing horizon; while, on the other hand, it is sometimes desirable to stop wells above the water contact of a reservoir, even though deeper productive horizons are known to exist.

The study of the geology of a field often reveals the feasibility of deepening certain wells. If 7-in. casing has been set, it is possible to carry a well 2,000 or 3,000 ft. deeper. If 5½-in. casing has been set, deepening is usually limited to a few hundred feet, and if a favorably located well with 7-in. casing set can be found, deepening should not be attempted through 5½-in. casing.

A third factor to be considered prior to recommending an expenditure for well remedial work is the availability of supervision for the work. In the working over of wells, it is essential that close and accurate supervision be maintained at all times in order to obtain good results. It is therefore important to take every precaution to see that there are not more workovers going on at one time in an area than can be adequately supervised by the personnel available.

In some areas, because of a shortage of 24-hour supervision it is common practice to use small rigs and work days only on practically all types of workovers where no new hole is to be made. It has been found that the cost of jobs when working days only is equivalent to those when working 24 hours, the result being the sacrifice of rapid recompletion time to the utilization of available supervision. Of course, in cases where a sacrifice of recompletion time would mean the loss of oil because of drainage, work is conducted on a 24-hour basis.

Also, in order to utilize available supervision best, wells which promise the quickest payout and those from which drainage would occur are given priority for workovers.

Lease Obligation

A fourth factor to be considered prior to recommending an expenditure for well remedial work is the lease obligation. When the last well on a lease goes off production, it is essential that it be called immediately to the attention of those responsible for remedial operations in order that adequate study can be given the well and remedial work can be properly planned before the lease obligation requires workover operations to be under way.

It is important to know the con-

TABLE 1—DETAIL OF PAYOUT CALCULATIONS

		Gross	Net
Estimated cost of work: Squeeze 7,384 to 7,390 ft.—Perforate 7,266 to 7,270 ft.		$11,816	$8,862
Detail of payout factors, estimated allowed production—bbl. per calendar day:	Period of estimated payout time— 1949	1950	1951	1951
Gross top allowable (7,000-8,000-ft. depth), B/D	163	....	....	....
25 Per cent	40.75	....	....	....
Less: Partner interest (if any) and royalty interest ⅛ and 3/48	22.92	....	....	....
Net interest	99.33	....	....	....
Posted field price per barrel ($)	2.77	....	....	....
Operating expenses per barrel ($):				
Lifting costs	0.1800	....	....	....
Severance taxes, gravity 32.0	0.2450	....	....	....
Pipe line regulation tax or enforcement taxes	0	....	....	....
Ad valorem taxes: 7,270 ft. × 3c = $218 ÷ 163 bbl. × 365 days (59,495)	0.0037	....	....	....
Total operating expenses	0.4287	....	....	....
Net revenue per barrel ($)	2.3413	....	....	....
Net revenue per day	232.56	....	....	....
Revenue to apply on well cost	8,837	....	....	....
Number of days revenue	38	....	....	....

Total number of: Days 38, months 1.2, years 0.1 to pay out.

Note: Well had quit flowing due to making 85 per cent salt water. The workover outlined above was completed for an initial production of 332 bbl. pipe line oil on 10/64-in. choke, tubing pressure 1,050 lb., GOR 436/1 and the well put back on production with top daily allowable of 163 bbl.

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tents of lease agreements, because, almost without exception, the lease obliges the operator, in order to hold the lease, to start drilling or reworking operations within a certain period after the last well on the lease ceases to produce. This period is usually 60 or 90 days.

Another factor to be considered prior to recommending an expenditure for well remedial work is drainage. When a well goes off production, an investigation must be made without delay to determine whether or not the well is being drained by an offset property, and if it is, every effort should be made to perform the necessary remedial work as soon as possible in order to reduce this drainage to a minimum.

On the other hand, if the oil from the well which goes off production can be obtained from another well on the same lease completed in the same reservoir, it is sometimes desirable to save the cost of recompleting in that section and either abandon the well or recomplete in another horizon which will not be drained by another well on the same lease.

In the Delta area of South Louisiana, dredging is a factor that must be considered prior to recommending expenditure for remedial work. This factor often adds considerably to the cost of such work.

During the time of the year when the Mississippi River is declining from its crest to normal tide, there is a great deal of silting action that takes place in the canals to well locations. In some cases, remedial operations conducted during this period would require dredging into the location prior to the start of work, and then dredging out of the location after the work has been completed, because of the silting action taking place while the remedial work is in progress. It can readily be seen that in such cases as this it would be highly desirable to postpone remedial work until after the silting period has stopped in order to avoid a double charge for dredging.

After recommendations have been made for performing remedial work on a well and such recommendations have been approved by both the production and geological departments, a payout calculation is made of the estimated cost as shown by the "Authorization for Expenditure" request to determine whether or not a payout on such expenditure can be expected in a reasonable length of time.

Payout Calculations

Table 1 shows a sample payout calculation sheet on a workover job. After this well had ceased flowing due to making 85 per cent salt water, a detailed study indicated that a successful workover with a top proration allowable of 163 bbl. daily could be expected by squeezing off the perforations through which the well had been producing and perforating up the hole in a new sand.

Based on the anticipated top allowable of 163 bbl. daily, the payout calculations indicated that payout of the total cost of this remedial work could be expected in 38 days. The work was completed as outlined and resulted in an initial production of 332 bbl. of pipe-line oil to give the top production allowable of 163 bbl. per day for a payout within the time estimated.

Of course, there are times when our payout calculations do not pan out as well as in the case just cited. Difficulties encountered in performing a workover often add considerably to the estimated original cost of the job, and a much smaller producer or no producer at all can result from the remedial work performed. In these cases, the wells will either show a much longer period of payout than estimated or else no payout at all. In the over-all workover program, a certain number of these can be expected.

In addition to showing the jobs that should give a return in a reasonable length of time on the money expended, these payout calculations often point out the advisability of disapproving certain remedial work which would appear to offer a fair chance of success from an anticipated producing-rate standpoint, but which would not show a payout due to the inadequacy of the reserves to be recovered.

Besides these estimated-payout calculations made on individual wells prior to approval of any workover requests, there is a semiannual payout statement made up after the wells, on which remedial work was performed during a 6-month period, have a 12-month production record. This report analyzes each job to determine its success or failure, which is shown by whether or not the amount of production recovered in 12 months following the workover will pay out the cost of the job; while a recapitulation of all these workovers gives an indi-

(Continued on page 80)

TABLE 2—FINAL PAYOUT STATEMENT OF WORKOVER JOBS COMPLETED IN FIRST HALF OF 1948 WHICH NOW HAVE A 12-MONTH PRODUCTION RECORD

	No. jobs	Total cost	Average cost/job	Successful jobs: No.	Successful jobs: Per cent	Prod. inc.-dec. 1 year or next W.O.	Payout status after 1 year	Av. W.O. cost/bbl. oil prod. inc., 1 year	Daily av. prod.: Before	Daily av. prod.: 1 year after	Increase daily prod. 1 year
W.O. same formation:											
Zone 1—Texas	20	205,494	10,275	12	60	322,776	649,556	0.64	78	694	616
Zone 2—Texas	3	4,411	1,470	2	66	7,604	13,396	0.58	19	39	20
Zone 3—Texas	10	51,325	5,133	10	100	.....	.....	....	.....	.....	.....
Zone 4—Texas	4	13,847	3,462	2	50	11,676	21,341	1.19	18	34	16
Zone 1—Louisiana	13	221,313	17,024	5	38	75,327	126,701	2.94	207	378	171
Total	50	496,390	9,928	31	62	417,383	810,994	1.19	322	1,145	823
W.O. higher formation											
Zone 1—Texas	3	12,124	4,041	2	66	23,554	43,130	0.51	3	64	61
Zone 1—Louisiana	5	154,128	30,826	4	80	223,787	360,687	0.69	0	612	612
Total	8	166,252	20,782	6	75	247,341	403,817	0.67	3	676	673
W.O. deeper formation:											
Zone 1—Louisiana	1	19,911	19,911	1	100	43,842	78,706	0.45	0	90	90
Grand total:											
Total—Zone 1—Texas	23	217,618	9,462	14	61	346,330	692,686	0.63	81	758	677
Total—Zone 2—Texas	3	4,411	1,470	2	66	7,604	13,396	0.58	19	39	20
Total—Zone 4—Texas	4	13,847	3,462	2	50	11,676	21,341	1.19	18	34	16
Subtotal	30	235,876	7,863	18	60	365,610	727,423	0.65	118	831	713
Total—East Texas	10	51,325	5,133	10	100	.....	.....	....	.....	.....	.....
Total—Zone 1—Louisiana	19	395,352	20,808	10	53	342,956	566,094	1.15	207	1,080	873
Total—oil wells	59	682,553	11,569	38	65	708,566	1,293,517	0.96	325	1,911	1,586
Total—gas wells*	2	19,304	9,652	2	100	49,747	*194,627	0.38	0	128	128
Grand total	61	701,857	11,506	40	66	758,313	1,488,144	0.93	325	2,039	1,714

*Includes revenue from both gas and condensate.

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Chemical Treatment of Flood Waters

Used in Secondary Oil Recovery

by Vance P. Gregory,* C. Richard Groninger,* and J. Henry Prusick*

CORROSION of metal equipment and plugging of injection wells are two major problems confronting maintenance of the water-flooding system. One solution to both of these problems is chemical treatment of the water. The chemicals, necessarily economical, must inhibit this corrosion and decrease the plugging tendency of injection wells.

Recently, it has been felt that another characteristic of this chemical should be its ability to aid the water in preferential wetting of the sand surfaces, thus allowing an easier removal of the oil in the viscous drag stage. The interfacial relationships among the three phases determine whether oil or water will flow more rapidly into the production well. It has been found that reduction of the surface tension of the aqueous phase causes more oil and less water to flow through the sand.

Corrosion is caused by the presence of dissolved oxygen in the water, and the corrosive character of acids present in the water. Plugging is caused by the growth of bacteria in the sand pores in the presence of water, and corrosion products (iron hydroxide) from pipes. The injected water is, therefore, not able to permeate easily through the tightly packed sand.

Three-Way Problem

If a chemical or a combination of chemicals could be found to inhibit corrosion, kill bacteria growth, and aid the water in wetting the sand, more economical water-flooding methods of secondary oil recovery can be realized. These are the problems considered by this paper.

A survey of the literature of the last few years indicated that the long-chain fatty amines and their salts have shown corrosion-inhibiting characteristics as water and oil additives. Since these chemicals are products of our company, our laboratory was assigned the task of running a series of screening tests to determine which amine or amine salt was the most effective corrosion inhibitor.

Bactericidal characteristics had already been established for many of the chemicals. Interfacial tension tests were made for surface-oiling properties, and an economical inorganic chemical was sought to combat the corrosion by dissolved oxygen. The importance of economy in this chemical treatment of the water was realized, and our tests were necessarily confined to very small concentrations of the amine or amine salt in the corrosive media.

The methods of testing in the laboratory are either static or dynamic in character, but they can only approximate field conditions, and until field tests can be run, definite conclusions must be reserved. Thus, it should be understood that any conclusions stated within this paper are confined to laboratory tests, and that we realize the need of actual field work to justify our results.

Discussion

The chemical nature of the flood waters through the country varies from slightly acid to alkaline. To simulate these conditions, acid solutions of hydrogen chloride, sulfuric acid, and hydrogen sulfide, as well as alkaline solutions, were prepared. Since the laboratory methods are necessarily accelerated in this case, stronger solutions than those found in natural water sources were used. Specifically, one series of tests were run in 4 per cent hydrochloric acid solution and 4 per cent sulfuric acid. Another series was run in 2 per cent sulfuric acid; .02 per cent hydrogen sulfide; and an alkaline solution of pH equal to 10.

To combat the dissolved oxygen in the water, sodium nitrite was tested, and found to be effective. Its limitations were realized, however, in that in acid waters of a pH less than 4, it ceases to inhibit the corrosion by dissolved oxygen in water. As a matter of fact, nitrous acid is formed and it increases corrosion in the stronger acid solutions. In H_2S solution, the nitrite is destroyed and has no inhibiting effect. The problem of the dissolved oxygen in the water has been solved to some degree in the field by the use of oxygen-free water in closed systems, but we feel that the protection is still necessary in these systems and particularly in open systems.

A wetting agent to aid the water in removing the residual oil from sand surfaces was sought. Interfacial tension tests were run, using samples of actual flood waters found in the Bradford fields and Pennsylvania crude oil. The better agents from these tests were then tested to see that they would not interfere with corrosion inhibition.

The chemicals tested for corrosion inhibition can be classified as nitrogen-containing compounds of fatty-acid derivatives. Amines, one of these compounds, can be thought of as substituted ammonias. They are classified as primary, secondary, or tertiary amines, depending on whether one, two, or three alkyl groups have replaced the hydrogen atoms of the ammonia radical NH_3.

The fatty acids, whose alkyl groups vary in length from 8 to 18 carbons, are ammoniated to nitriles and subsequently hydrogenated to yield the amines. Depending upon conditions, primary or secondary amines result. Another of these compounds, amine acetate salts, is produced by neutralization of the amines with glacial acetic acid. A third chemical group also tested is the quaternary ammonium compounds. They are monoalkyl trimethyl or dialkyl dimethyl ammonium chlorides, and are produced by combining the corresponding amines with methyl chloride.

The wetting agents tested are compounds formed from the reaction of a fatty acid and ethylene oxide. Varied molar ratios of the two components yield compounds which vary in character, each suitable for specific solutions. Another group of wetting agents are those formed from a combination of the amines and ethylene oxide.

The bactericidal tests were run on agents alone to test their power; then on combinations of germicidal wetting agents, and corrosion inhibitors. These tests served to prove that each constituent would not interfere with the characteristics of the other constituents in the chemical compound necessary for water treatment.

A series of tests were also run to establish uninhibited and inhibited rates of corrosion. These tests were run to observe the effect of inhibitors on the rate of corrosion. Graphs were drawn from the data obtained to further illustrate this effectiveness.

From the above discussion, the laboratory plan of attack has clearly been shown. It was soon realized that one chemical could not satisfy all the problems confronting the treatment of flood waters, so each problem was considered separately. Thus a combination of chemicals is our solution to these problems and the selection of this combination was made from the

*Armour development laboratory, Armour Chemical Division, Chicago. Summary of paper given at American Chemical Society symposium on "Conditioning Water for Repressuring Oil Fields and for Underground Disposal," Houston.

tests described in the following paragraphs.

Test Results

Before reviewing the results shown in the following material, some information concerning them is necessary.

First, the results published for a single inhibitor is an average result of three trials in each case. In other words, three individual tests were conducted, and the results averaged. This was done to allow for mechanical variances of the experiment and the human element of error in the laboratory work.

Secondly, although it was previously mentioned in this paper that amides and nitriles would be evaluated as corrosion inhibitors, they were found to be too insoluble in water for this application. The amine acetates and quaternary ammonium compounds are soluble in water, and thus were found applicable for corrosion inhibition in water. It is felt that flocculent or cloudy solutions would mean consequent plugging of injection wells, **so only clear water solutions of our chemicals were tested.** However, we do recognize the value of amines, amides, and nitriles as oil additives to inhibit corrosion, and current research work is being conducted in our laboratory on their evaluation.

TABLE 1—4 PER CENT H_2SO_4 SOLUTION

Inhibitor—	Conc. of inhib., p.p.m.	ipy	% Eff.
Control	..	.1604	..
Arquad 2C	10	.0257	84
Arquad 2C + Ethofat 142/15 (15:1)	10	.0335	79
Arquad 2C + Ethofat 142/15 (4:1)	10	.0402	75
Arquad 2C	5	.0415	74
Arquad S	10	.0652	59
Rosin Armac	10	.0772	52
Armac C	10	.1048	35
Armac S	10	.1140	29

Note: All concentrations are based on active ingredient.

TABLE 2—4 PER CENT HCl SOLUTION

Inhibitor—	Conc. of inhib., p.p.m.	ipy	% Eff.
Control	..	.1025	..
Armac S	10	.0034	97
Armac C	10	.0040	96
Arquad 2C	10	.0045	95
Arquad 2C + Ethofat 142/15 (9:1)	10	.0051	95
Arquad S	10	.0053	95
Arquad S + Ethofat 142/15 (9:1)	10	.0049	95
Rosin Armac	10	.0170	83

TABLE 3—2 PER CENT H_2SO_4 SOLUTION

Inhibitor—	Conc. of inhib., p.p.m.	ipy	% Eff.
Control	..	.1056	..
Arquad 2C	10	.0178	83
Arquad 2C	5	.0270	75
Arquad 2C	2	.0310	70
Arquad 2C + Ethofat 142/15 (9:1)	10	.0178	83
Ethomeen S/12	10	.0211	80
Ethoquad S/12	10	.0215	79
Arquad S	10	.0308	71
Armac C	10	.0374	65
Arquad 2HT	10	.0466	56
Rosin Armac	10	.0473	55
Ethomeen 12/12	10	.0622	41

TABLE 4—2 PER CENT H_2SO_4 SOLUTION

Inhibitor—	Conc. of inhib., p.p.m.	ipy	% Eff.
Control	..	.1104	..
Arquad 2C	10	.0117	87
Arquad 2C	5	.0153	84
Arquad 2C	2	.0318	67
Ethoquad S/12	10	.0149	84
Ethoquad S/12	5	.0177	82
Ethoquad S/12	2	.0344	65
Arquad 2C + Ethofat 142/15 (1:1)	10	.0175	84
Ethofat 142/15 (1:1)	5	.0237	78
Ethofat 142/15 (1:1)	2	.0314	71
Arquad S	10	.0261	72
Arquad S	5	.0284	69
Arquad S	2	.0378	60
Arquad S + Ethofat 142/15 (9:1)	10	.0202	78
Ethomeen S/12	10	.0291	79
Ethomeen S/12	5	.0331	71
Ethomeen S/12	2	.0436	54
Rosin Armac	10	.0229	76
Rosin Armac	5	.0551	61
Rosin Armac	2	.0881	37

TABLE 5—H_2S AND NaOH SOLUTIONS

1. H_2S was bubbled through train of bottles containing 5 per cent NaCl and inhibitor (20 p.p.m.) for 2 hours at room temperature.

Inhibitor—	ipy	% eff.
Control	.051	
Armac C	.009	82.5
Arquad 2C	.020	61.0

2. H_2S was bubbled through a similar solution for 8 hours per day; total time of test was 122 hours, the metal strips remaining in solution overnight.

Inhibitor—	ipy	% eff.
Control	.020	98
Armac C (20 p.p.m.)	.0003	98
Armac C (40 p.p.m.)	.0003	98

3. A third test in a similar solution was tried for 98 hours.

Inhibitor—	ipy	% eff.
Control	.021	....
Armac C (10 p.p.m.)	.007	66.7
Rosin Armac (10 p.p.m.)	.005	76.5

4. Static tests similar to the acid solution tests were run in a NaOH solution of pH = 10.5.

Inhibitor—	ipy	% eff.
Control	.0018	....
Arquad 2C (5 p.p.m.) + $NaNO_2$ (50 p.p.m.)	.0000	100.
$NaNO_2$ (50 p.p.m.)	.0005	72.5

Note: The amine acetates are converted to the amines in alkaline solutions, so these salts were not tested.

For ease in recording, the trade names of our chemicals were used. The "Arquads" are quaternary ammonium chlorides and the "Armacs" are the amine acetates. The "Ethofats" are wetting agents formed from the reaction of fatty acids and ethylene oxide, and the "Ethomeens" are reaction products of amine and ethylene oxides.

Specifically, Armac S is an acetate of soya amine, Armac C an acetate of coco amine, and the Rosin Armac is the acetate salt of the rosin cut of tall oil amine. Arquad 2C is a dicoco dimethyl ammonium chloride, while Arquad S is a monosoya trimethyl ammonium chloride. Ethofat 142/15 is a product of one mol of fatty acid (Neo-Fat 142) and 5 mols of ethylene oxide. (In the nomenclature of the wetting agents, the number to the right of the slant line minus 10 is the number of mols of ethylene oxide combined in the chemical).

TABLE 6 — INTERFACIAL TENSIONS — BRADFORD FIELD WATER VS. PENNSYLVANIA CRUDE OIL
(5 p.p.m. agent added to water phase)

Agent—	Dynes /cm.
Ethofat:	
C/15	34
C/20	29
C/25	22
C/60	20
142/15	14
142/20	31
142/25	18
142/60	18
242/15	28
242/20	25
242/25	22
242/60	18
60/15	29
60/20	25
60/25	25
60/60	23
Ethomid:	
C/15	24
C/20	23
C/25	24
C/60	22
RO/15	29
RO/20	22
RO/25	20
RO/60	20
HT/15	28
HT/20	25
HT/25	21
HT/60	16
Ethomeen:	
C/15	21
C/20	20
C/25	19
C/60	22
S/12	15
S/15	15
S/20	9
S/25	13
S/60	19
T/15	15
T/20	11
T/25	11
T/60	18
18/15	15
18/20	11
18/25	10
18/60	15
Arquad 2C	22
S	14
Ethoquad S/12	20
Igepal CA Extra Conc.	23
Arquad 2C—Ethomeen S/20 (2.5 p.p.m. each)	15
Arquad S—Ethomeen S/20 (2.5 p.p.m. each)	12
No surface active agent	35

To evaluate various compounds as inhibitors, the following method was employed:

A mild steel strip (3 by 3 by 0.025 in.) was used as the testing panel in each test. The strip was first polished with 120 emery cloth, and then washed with soap and water. The metal strip was dried with a clean cloth, and allowed to stand in benzene until ready for use. Before using, the strip was washed with alcohol and acetone, weighed, and placed in a bottle containing 200 ml. of the corrosive solution.

The bottle was capped, shaken well, and allowed to stand undisturbed at room temperature for 24 hours. The metal strip was then removed, washed and dried in the same manner as before, and reweighed. The solution's attack upon the metal is determined by the loss in weight of the metal strip. An inhibitor in the corrosive solution will reduce this loss. To compare the effectiveness of various inhibitors, the loss

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in weight was computed as inches penetration per year (ipy).

$$ipy = \frac{24 \times 30 \times w}{(2.54)^2 \times A \times s \times t}$$

w = wt. loss of sample in grams
A = total area of sample in sq. in.
s = specific gravity of steel sample (g/cc)
t = time in hours

A per cent efficiency (% eff.) term was developed for a clearer comparison of effectiveness:

$$\text{Per cent efficiency} = \left(\frac{\text{ipy of control} - \text{ipy inhibitor}}{\text{ipy of control}} \right) 100$$

Conclusions

The 4 per cent acid solution tests were the preliminary screening tests. From Table 1 it can be observed that dicoco amine dimethyl ammonium chloride (Arquad 2C) is an effective corrosion inhibitor; more so than the amine acetates tested. A test to observe the effect of adding a wetting agent was made to ascertain the fact that the wetting agent would not interfere with the corrosion-inhibiting tendencies of the inhibitor. The results substantiate this theory reasonably well.

In Table 2, the amine acetate compared very favorably (in hydrogen chloride solution) with the quaternary compounds. Since there was so little observable corrosion in this solution, further tests in this acid were discontinued. A sulfuric acid solution of approximately 2 per cent concentration was decided upon for further corrosion tests, since clear-cut results were observable.

The second table of results in 2 per cent sulfuric acid is shown to illustrate a correlation series of tests for Table 3. It further substantiates our theory that a smaller concentration (than 10 p.p.m.) of Arquad 2C is as effective in corrosion inhibition as a larger concentration of amine acetate.

The hydrogen sulfide tests show amine acetates with an edge over quaternary compounds, but alkaline tests prove the value of quaternary compounds in alkaline waters. The inhibited rate of corrosion is illustrated clearly on the graph of rates (Fig. 1). This is certainly a clear picture of the economy involved in chemically treating flood waters.

The bacteria tests and interfacial tension tests are more or less conclusive by themselves. From these, and the corrosion tests, Arquad 2C employed in 5 p.p.m. concentration, sodium nitrite in 50 p.p.m., and Ethofat 142/15 or Ethomeen S/20 in 5 p.p.m. are the most effective as well as economical chemical combination that we have evaluated to date.

In conclusion, then, we feel that a combination of three chemicals is necessary for complete chemical treatment of flood waters used in secondary oil fields. An economical, inorganic antioxidant; a quaternary ammonium compound; and a wetting agent are the three specific chemicals. Evaluation in terms of cost in the specified concentrations proves their value in realizing economy in floodwater treatment for secondary oil recovery.

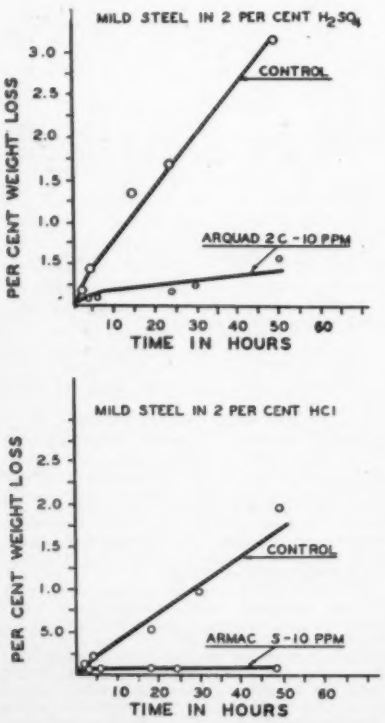

Fig. 1—Inhibited and uninhibited rates.

Use of Solid Explosives In West Texas

(Continued from page 63)

sive's force seems to be transmitted to the bore-hole walls slower and farther into the rock. Apparently, the explosive force finds weak points along the bedding planes, starts fracture, and cracks these fractures back into the formation rather than pulverizing the formation immediately around the borehole.

This idea of heaving action of explosives has long been employed in coal mining to produce more lump coal. It would have been applied sooner in oil-well shooting had it not been so difficult to find an explosive having this characteristic that would withstand the heat and fluid pressure in oil wells. Similarly, in quarry operations, it has been found that an explosive having a high rate of pressure development tends to shatter locally, but often does not drive the cracks very far.

On the other hand, an explosive having a lower rate of pressure development, even though it was weaker, would send lateral cracks to a greater distance, thus permitting wider spacing of the holes. It has been noticed in surface blasting that high-speed explosives tend to shatter caves in sandstone formations without sending out wide cracks as are encountered with explosives having a heaving action. There is every reason to believe that similar tendencies would be encountered in an oil well.

Results

By far the most important result of use of the new solid explosive is a shorter cleanout time for wells in which it has been used over that in wells shot with nitroglycerin. This shorter time is probably occasioned by two things: (1) less shattering of the bore-hole wall and less pulverized material in the bottom of the hole, and (2) less material run into the hole with the shot that will not decompose or disintegrate upon detonation of the shot.

There is some evidence to show that the shot does not shatter the wells of the hole. Caliper surveys run by several companies indicate that hole enlargement is much less, perhaps less than half as much, as with nitroglycerin. Therefore there is a much smaller quantity of loose wall material to take from the hole.

Too, since the explosive is run on a stranded wire line rather than in tinned shells, there is very little metal left in the hole to ball up or plug bits to slow cleanout. The cable apparently is blown to bits since very little of it is noticed in the material cleaned out of the well. The aluminum tube in the center of the explosive block disappears, probably burning or completely disintegrating with the blast.

Where this explosive has been used in cable-tool holes, cleanout time has been halved, at least, and some results are even better. Average cleanout times in the area visited by the writer for one of these wells shot with nitroglycerin was about 12 days, varying, of course, with depth and the type of formation shot. However, using solid explosives, halving the cleanout time would save an operator from 5 to 10 per cent of the cost of the well.

In rotary holes, too, there is a considerably shorter cleanout time occasioned by use of this new explosive. Because there is less material torn from the walls of the hole, and because there is little metal in the hole to plug the bits or ball up and slow the operation of the reverse-circulation methods used, cleanout proceeds much more rapidly.

In some 8,000-ft. rotary holes in Tex Harvey field, Midland County, Texas, cleanout time has been lessened by 20 days in some instances, a saving of about $10,000 per well. This includes rig time and additional days of production—considered by most operators as money in the pocket.

Production results in Tex Harvey

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A distributor nearby carries a large stock of genuine TUBE-TURN welding fittings and flanges . . . in a wide range of types and sizes . . . to assure you prompt delivery for all your needs. Their experienced piping men will gladly help you in your piping problems...Call them for this complete service!

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TUBE-TURN SEAMLESS WELDING FITTINGS—RANGE OF SIZES

Description	Standard Weight	Extra Strong	Schedule 160	Double Extra Strong	Light Gauge: Nominal Pipe Size	Light Gauge: Iron Pipe Size
ELBOWS 90° Long Radius	½"-30"	½"-30"	1"-12"	¾"-8"	4"-24"	¾"-12"
90° Long Tangent	1½"-12"	1½"-12"	....	....	....	....
90° Reducing	2x¾" 6x2½"	2x¾" 6x2½"	....	....	....	....
90° Short Radius	1"-30"	1½"-30"	....	....	....	....
45° Long Radius	½"-30"	½"-30"	1"-12"	¾"-8"	4"-24"	¾"-12"
RETURNS 180° Long Radius	½"-30"	½"-30"	1"-12"	2"-8"	4"-24"	¾"-12"
180° Short Radius	1"-30"	1½"-30"	....	....	....	....
180° Ex. Long Radius	1"-2½"	1"-2½"	....	....	....	....
TEES—Straight	½"-24"	½"-24"	½"-12"	½"-8"	....	....
Reducing Outlet	½"-24"	½"-24"	¾"-12"	¾"-8"	....	....
REDUCERS Concentric & Eccentric	¾"x¾"-24"x16"	¾"x¾"-24"x16"	¾"x¾"-12"x5"	¾"x½"-8"x3½"	....	....
CAPS	¾"-24"	¾"-24"	1"-12"	1"-8"	....	....
STUB ENDS—Lap Joint	½"-24"	½"-24"				
SADDLES	2"-24"*					
LATERALS—Straight	1"-24"	1"-24"				
Reducing	1"-24"	1"-24"				
CROSSES—Straight	¾"-24"	¾"-24"				
Reducing	¾"-24"	¾"-24"				
RINGS—Groove Type	¾"-24"	1"-24"				
Ridge Type	¾"-12"	¾"-12"				
SLEEVES—Welding	2"-24"*					

Also available in certain sizes are: 90° long and short radius elbows, 45° long radius elbows and 180° long and short radius returns in Schedules 30, 40, 60 and 80; and 45°, 90° and 180° Super elbows and returns in Standard Weight and Extra Strong.

Tube-Turn welding fittings and flanges conform to applicable ASA and ASTM Standards.

*Since saddles and sleeves are used for external reinforcement only, they do not conform to iron pipe size thicknesses.

TUBE-TURN FORGED STEEL FLANGES—RANGE OF SIZES

	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.
WELDING NECK	½"-24"	½"-24"	½"-24†	½"-24"	½"-24"	½"-24"	½"-12"
SLIP-ON	½"-24"	½"-24"	½"-24†	½"-24"	½"-24"	½"-24"	½"-12"
LAP JOINT	½"-24"	½"-24"	½"-24†	½"-24"	½"-24"	½"-24"	½"-12"
THREADED	½"-24"	½"-24"	½"-24†	½"-24"	½"-24"	½"-12"	½"-12"
BLIND	½"-24"	½"-24"	½"-24†	½"-24"	½"-24"	½"-24"	½"-12"
SOCKET TYPE	⅛"-24"	⅛"-4"		⅛"-3½"	...	...	..
REDUCING Threaded or slip-on	¾"-24"	¾"-24"	¾"-24†	¾"-24"	¾"-24"	¾"-24"	¾"-12"
ORIFICE—threaded	.	1"-24"	4"-12"	1"-12"	3"-12"	1"-12"	...
ORIFICE—slip-on		1"-24"					...
ORIFICE—welding neck		1"-24"	4-12"	1"-12"	3"-12"	1"-12"	

†Dimensions on sizes thru 3½" same as for 600 lb. flanges.
*Dimensions on sizes thru 2½" same as for 1500 lb. flanges.

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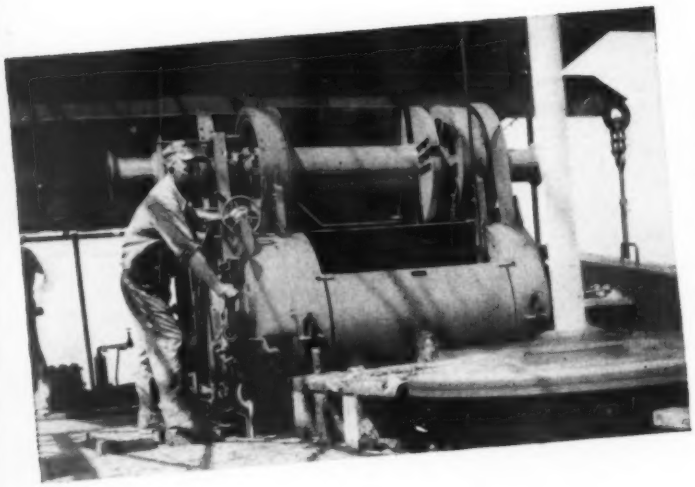
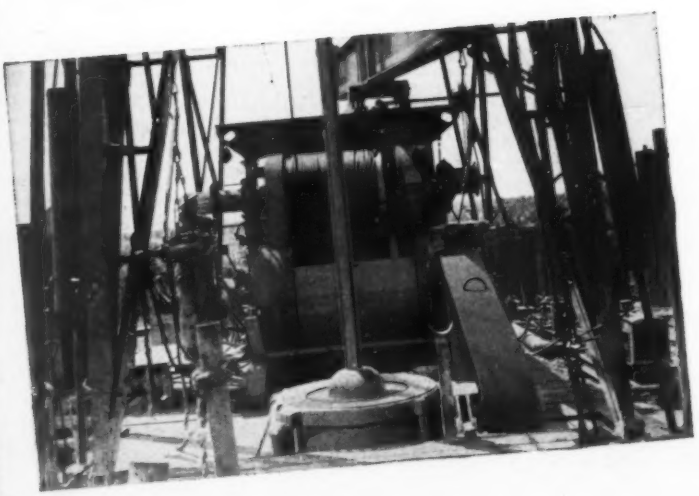


Model H, Model K and Model R are recommended for drilling to 2,500, 3,500 and 4,500 feet respectively with 4½" drill pipe, and workover jobs to 5,000, 7,000 and 10,000 feet. "Cardwell" friction clutches operate both drums and the rotary table drive.

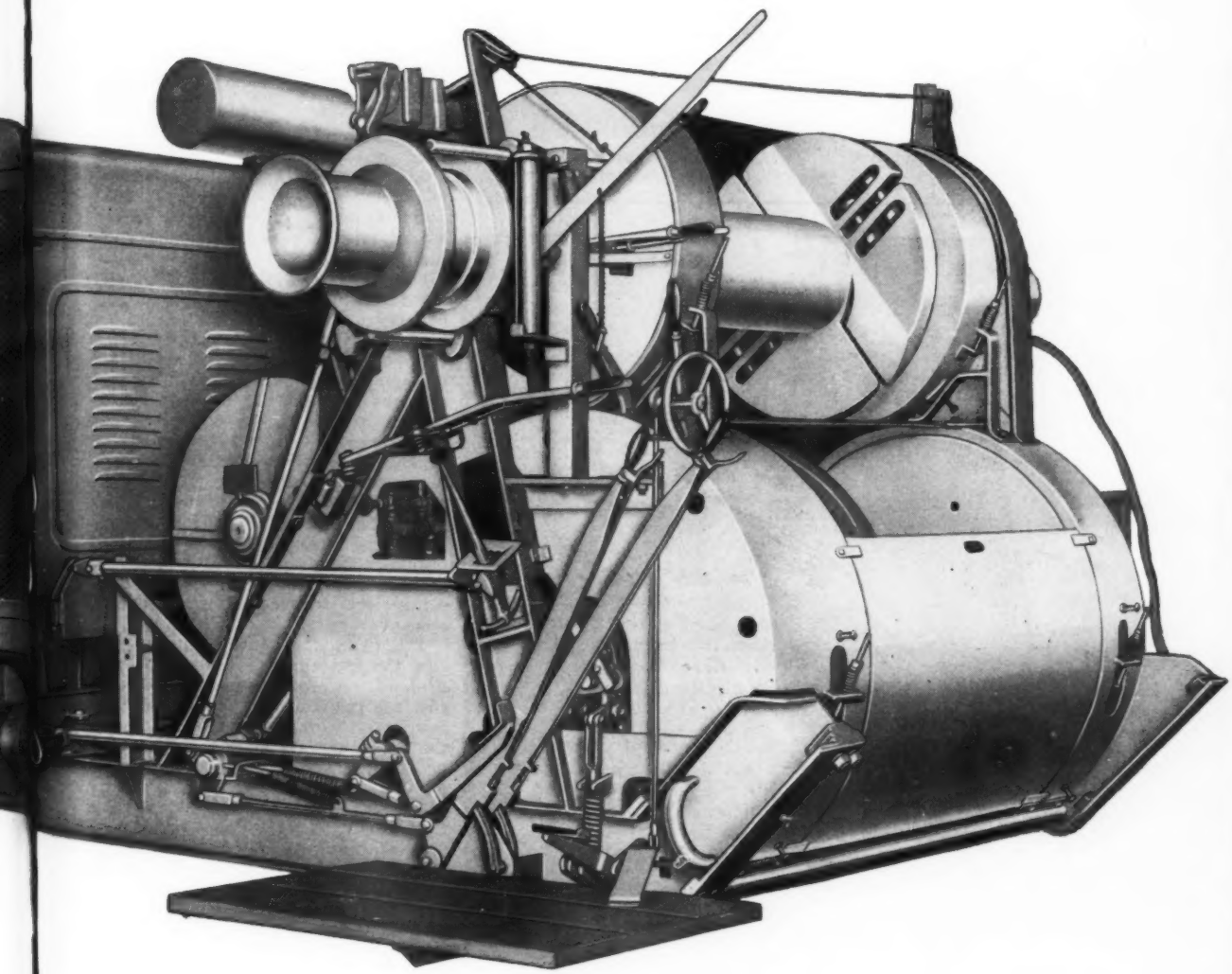
All three models can be converted to cable tool operations by changing from rotary to spudder. Model H is recommended for cable tool drilling to 3,600 feet, Model K to 5,000 feet, and Model R to 7,500 feet. 55- or 65-foot double leg mast is available.



Model R is available with beam assembly for cable tool drilling, well servicing, and pumping potentials. The rotary assembly and beam can be installed on the same rig, making it possible to do cable tool and rotary work with no changes in equipment. A special wide-spaced mast is available when the Model R with beam is used for cable tool work. Model R is recommended for rotary drilling to 4,500 feet with 4½" drill pipe, and cable tool drilling to 7,500 feet.

drilling and servicing rig

—MAKES MORE PROFITS



The profit advantage of this "Cardwell" rig is its versatility. This combination rig can be equipped to do every kind of rotary or cable tool drilling and servicing job, and its performance is always outstanding.

Hundreds of operators have proved the "Cardwell" rig is a money-maker because of its fast operating speed, minimum haulage costs and low maintenance expense. There are three sizes of "Cardwell" combination rigs to fit your requirements. *Write for complete information.*

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field have also been better than with nitroglycerin explosives. This, however, is difficult to prove since comparative results on the same well, of course, are unavailable.

The increase in production over a nitroglycerin shot can be attributed to the action of the explosion itself. The slower action, fracturing the formation back from the well bore, forms a large effective collecting system for oil drainage from the reservoir. A crack in the formation, however small, will transport a large quantity of fluid under the pressure differentials that exist between a pay section and the well bore itself.

Although the largest percentage of shooting has in the past been devoted to sand formations, this new explosive holds promise for shooting limestone. Whereas in the past, the extremely high-velocity explosives might actually hurt a limestone pay by shattering and compacting the formation, this explosive, being slower and less likely to compact the rock, might be applicable.

Well Remedial Work

(Continued from page 72)

cation of the payout of the over-all workover program carried on during the 6-month period.

Table 2 shows a sample of one of these recapitulations or payout summaries. This recapitulation breaks down the jobs by areas and by types of workovers, and separates the workovers on oil wells from those on gas wells.

The main reasons for such breakdowns are as follows: (1) The costs for the same type of work vary from area to area due to difference in depth, reservoir pressure, and methods of doing such work; (2) the "same formation" classification of workovers includes a great many minor jobs, such as resetting screens and plugging off water, as against that of mostly "major workovers," which includes recompleting in higher or lower formations; (3) the degree of success of workover operations can be noted of each type of work in each area.

Most of the headings of the various columns in the summary sheet are self-explanatory, but there are three columns that call for some clarification in order to understand better the over-all picture. The "Production Increase-Decrease" column represents a year's gross production after workover, less 365 days of the daily gross production rate of any wells that were producing prior to workover. This minus production is usually small, as, in most cases, the well had already sanded up or ceased flowing before workover operations had begun.

The "Payout Status" column carries the net revenue or payout figures on the production obtained as a result of the workover operations. The last column in the summary shows the daily rate at which the wells are producing after being back on production a year, and it gives an indication of future additional recovery resulting from the remedial work performed during the 6-month period.

It will be noted from the summary sheet that during the semiannual period 59 jobs on oil wells were performed at a total cost of $682,553, and the increased production for 12 months following the workovers amounted to 708,566 bbl. of oil for a workover cost per barrel of $0.96. The year's production yielded a total net revenue of $1,293,517 on the total workover expenditure of $682,553. The net revenue per barrel, which was the net price received for the oil after deducting royalty, production expense, and taxes, was $1.825.

The two workovers on gas wells gave a net revenue of $194,627 as against the workover cost of $19,304. Thus on the total workover program for the 6-month period, a net revenue of $1,488,144 was received on 12 months' production from the $701,857 spent for workovers, representing a net profit of $786,287. In addition, these reworked wells after a year's production were still producing 2,039 bbl. daily for an approximate daily revenue of $3,250.

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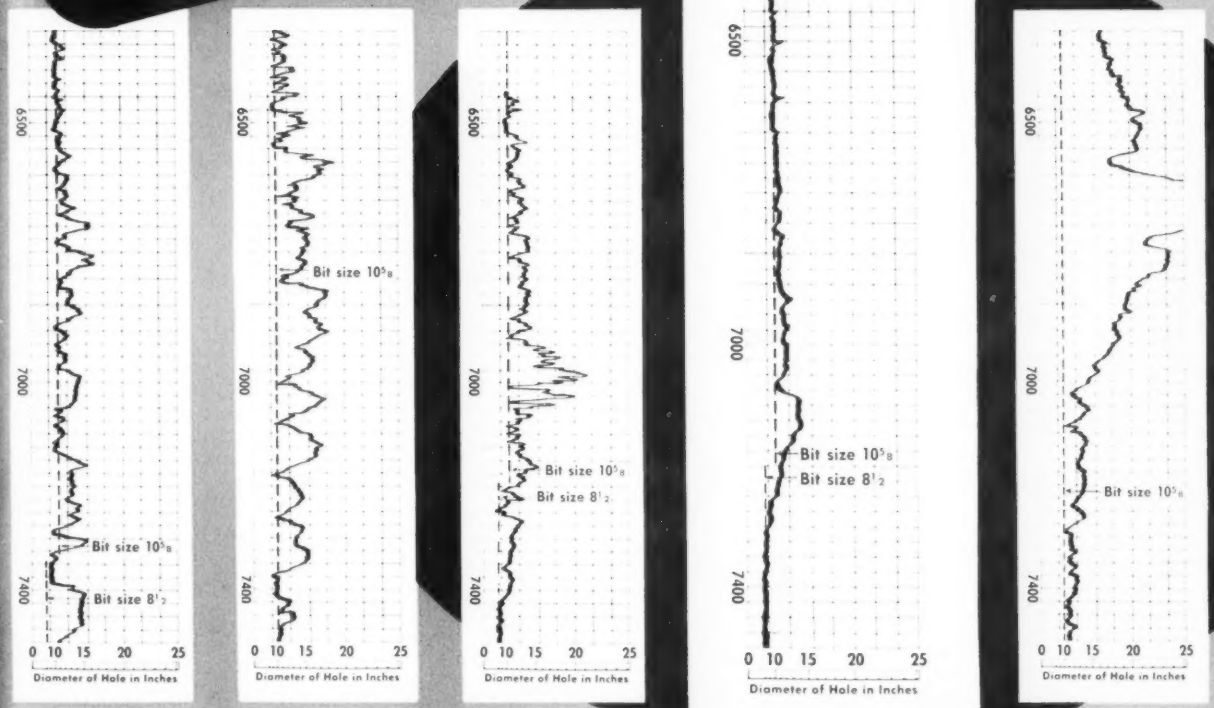
EMULSION DRILLING FLUID

THESE 5 CALIPER LOGS were run in 5 different offset wells in a San Joaquin Valley field. In each case the formation was almost identical. A section of approximately 500 feet of green bentonitic claystone which is highly susceptible to washing out was encountered. Siltstone, silty claystone and silty sandstone lay above and below. White Magic with its low water loss and tough, pliable oily mud cake kept the hole nearer to gauge and lessened the danger of wash outs.



WELL NO. 1
Lime-Base Starch Mud
(API fluid loss, 3.8 cc)

WELL NO. 2
Clay-water mud
(API fluid loss, 8-10 cc)

WELL NO. 3
Soap-type emulsion
(API fluid loss, 6-8 cc)

WELL NO. 4
WHITE MAGIC
(API fluid loss, 3.0 cc)

WELL NO. 5
Clay-water Mud to 7000', Soap-type emulsion to T.D.(API fluid loss, 6-8cc)

In troublesome areas where formations wash badly and tight hole conditions exist, low water-loss (0-10 cc API) White Magic keeps the hole nearer to gauge and lengthens bit life. White Magic is not a soap and requires no caustic or chemicals to activate it: the moment White Magic is added to the mud system, it acts as an emulsifier. It is the most stable of emulsifiers and can easily be converted to a lime base. Cement, gypsum, anhydrite and the usual contaminants that adversely affect clay-water muds and soap-type emulsifying agents present no problems. Twelve consecutive cement squeeze jobs were done in White Magic. Subsequent drilling entailed no mud difficulties.

Unlike soap-type emulsifiers, White Magic can be weighted with barites, without a slow but progressive deterioration of the emulsion under field conditions. Viscosity and gel properties are comparable to those found in clay-water muds. Good electric logs are easily obtained. White Magic helps lubricate bit bearings, reduces drill pipe torque often as much as 40%, resulting in less wear on equipment and fewer pipe and drill collar failures. It is a powder unaffected by climatic conditions, packed in 100 lb. sacks for ease of handling and may be added to any water-base mud in the normal manner. After crude or refined oil is introduced, the emulsion mud is ready for use. It is light tan in color and can be washed off the rig and equipment with water.

MAKE YOUR OWN TEST To compare the effect of cement and similar contaminants on soap-type emulsifiers, conduct this simple test: Mix 245 cc of water, 105 cc crude oil (20-35 API gravity) and 10 grams of any soap-type emulsifier in a high speed mixer for 5 minutes. (This approximates the same proportions of ingredients used in an actual field emulsion.) Then add 20 grams powdered cement and mix for 5 minutes. Allow to stand for 24 hours and notice the separation of the emulsion. Try the same experiment with White Magic and note the difference. White Magic will remain stable in the presence of calcium and magnesium ions when others fail. *(Write for free copy of the White Magic Handbook containing general data on muds.)*

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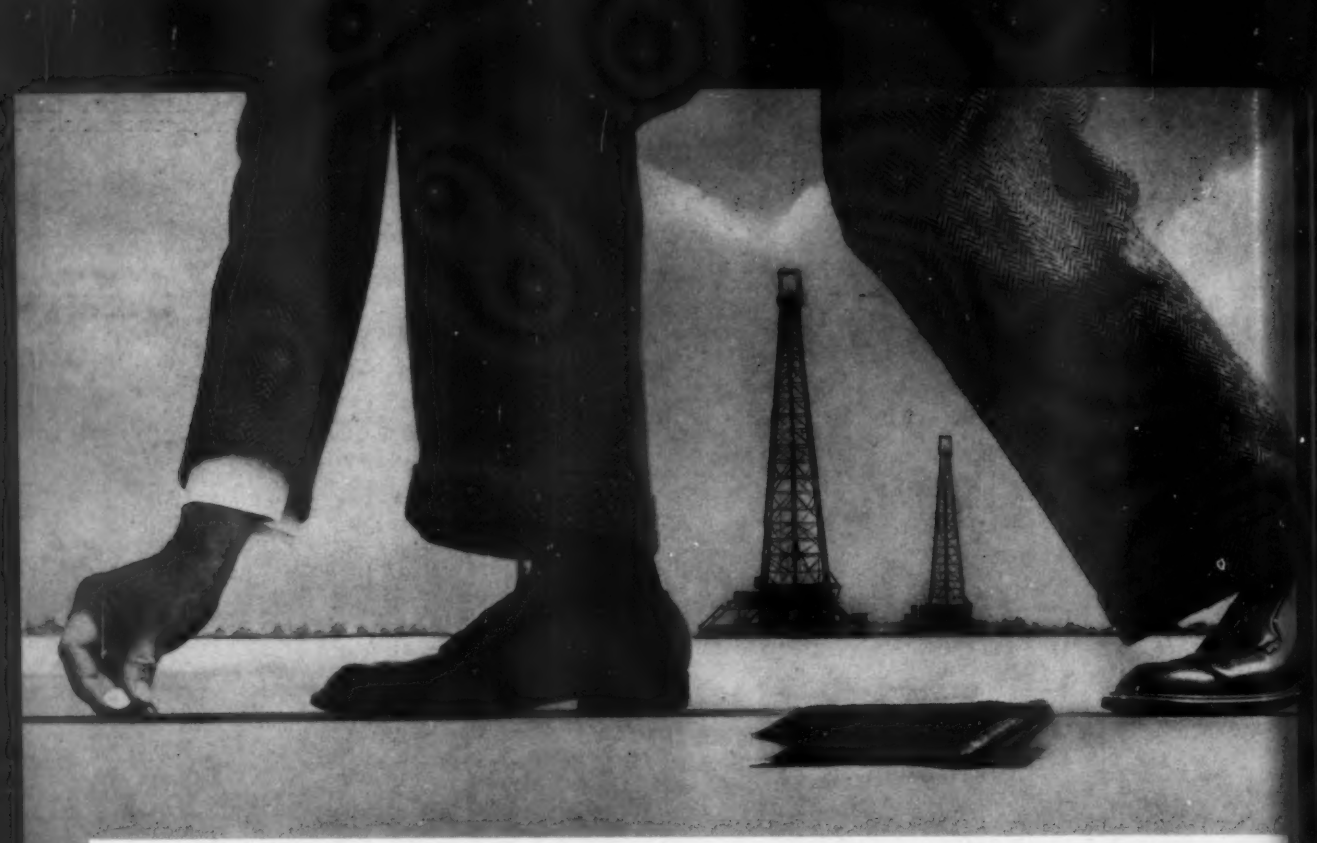

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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Embrittlement of Welded Stainless Removed by Annealing

UNEXPECTED embrittlement has been encountered in several welded chromium stainless steels; a method of remedying this difficulty by post annealing was described by Helmut Thielsch in the Welding Journal (March 1950).

The author found that water quenching or air cooling Types 405, modified 410 (less than 0.08 per cent carbon) and 430 stainless steels from temperatures above 2,200° to 2,300° F. will produce in them a rather abrupt embrittlement and increase in hardness. Such temperatures are encountered in the heat-affected zone during welding.

Although embrittlement seems to accompany severe grain growth, large grain size alone does not account for the phenomenon. Nor do hardness values alone give a true indication of the other mechanical properties of these stainless steels. Thus, although two specimens of the same alloy, quenched from different elevated temperatures, exhibited identical hardness values the elongation was found to vary by as much as 20 per cent (in 2 in.) and the Charpy impact values by 20 to 25 ft.-lb. Therefore, acceptance of welds in these ferritic steels cannot be based on hardness tests alone.

With the exception of excessive grain growth, the detrimental effects of this overheating can be removed by annealing between 1,350° and 1,450° F. In part this can be accomplished by depositing multibeads instead of single beads. Wherever restoration of the ductile properties of the steel is of major importance, however, post annealing is far more effective than any change in welding technique.

An abstract taken from the June 1950 issue of Materials and Methods.

Cast-Iron Symposium

THE papers and discussions in the A.S.T.M. symposium on testing of cast iron with SR-4 type of gage, sponsored by A.S.T.M. Committee A-3 on Cast Iron, were presented at the annual meeting of the American Society for Testing Materials held in Atlantic City, June 1949. The symposium was made available in bound form in April 1950.

The symposium, following an introduction by J. S. Vanick, covers the analysis of locked-in stresses in automotive cylinder blocks; residual stresses in cylinder blocks and in cast-iron deaerating trays; stress analysis of automotive cylinder blocks, and of cast iron 125-lb. valve assembly, split tapping sleeve, and for valve parts; strain testing of crankshafts, engine frames, and cylinders; strain gage tests on diesel cylinder blocks, heads, and pistons, and studies of cast-iron punch-press frames; stress-strain tests on rectangular and various cast-iron beams and sections, and studies of cast iron for textile-machinery parts. Also stress determinations of cast iron for railroad service; and the location and measurement of stresses in gray-iron tractor castings.

The 96-page booklet can be obtained from the American Society for Testing Materials, 1916 Race Street, Philadelphia, at $1.65 each.

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GRAY iron accounts for about four-fifths of the tonnage of all castings produced by American industry. There are literally hundreds of thousands of gray-iron patterns in existence and millions of gray-iron castings are at work. The gray iron industry is the second largest metal-working industry in the United States, being surpassed only by the rolled or wrought-steel industry.

Gray Iron Casting Specifications

(2. HIGH-TEMPERATURE AND SCALE-RESISTING CASTINGS)

PRESSURE CASTINGS FOR USE AT HIGH TEMPERATURES

Specifying body and Spec. No.—	Class	Required chem. analysis: % S max.	% P max.	%C	% Si	% Mn	Other	Tensile strength (psi.)	Brinell hardness max.	Use
A.S.T.M. A278-44T	40	0.12	0.25	C.E. = 3.8% max.[1]			....	[2]40,000	.....	Gray iron castings for pressure - containing parts for temperatures up to 650° F.
	50	C.E. = % total C. + 0.3 (% Si + % P)					....	50,000	.....	
	60	.....	....	....	....	....	....	60,000	.....	

NONPRESSURE CASTINGS FOR USE AT HIGH TEMPERATURES

		Recommended Max.	Max.	Min.	C.E.			Use
A.S.T.M. A319-48T	I[3]	0.12	0.6	3.5	3.81/4.4	....	Superior thermal shock resistance, low to moderate tensile strength	
	II[3]	0.12	0.6	3.2	3.51/4.1	....	Average thermal shock resistance, moderate tensile strength up to 30,000 psi.	Gray iron castings for elevated temps. for nonpressure containing parts
	III[3]	0.12	0.6	2.8	3.2/3.8	....	Higher tensile strength classes I or II (up to 40,000 psi.) may be specified	

GRAY IRON ALLOY CASTINGS (SCALE RESISTING)

						Ni				
Navy 46-1-9		0.10	0.20	2.6/3.0	1.25/2.20	0.8/1.3	12/15	[4]25,000	120/180	Iron, gray, alloy; castings (scale-resisting)

1. All irons may be alloyed to stabilize structure for elevated temperature service.
2. Castings and test bars shall be stress-relieved previous to test (Sec. 2b, A.S.T.M. Spec. A278-44T).
3. If alloyed with chromium in the indicated ranges each class shall be further subdivided into the following "types": A-0.20/0.40; B-0.41/0.65; C-0.66/0.95; D-0.96/1.20 per cent. All classes may be further alloyed.
4. Tensile test coupons to be cast attached to casting if practical and not injurious to either. As alternate procedure, specimen should be cast to special block. Dimensions tensile specimen correspond to A.S.T.M. A124-39 (discontinued by A.S.T.M. in 1939).

Castings may be annealed by heating to 1,750° F. and cooling in air or quenching in oil.

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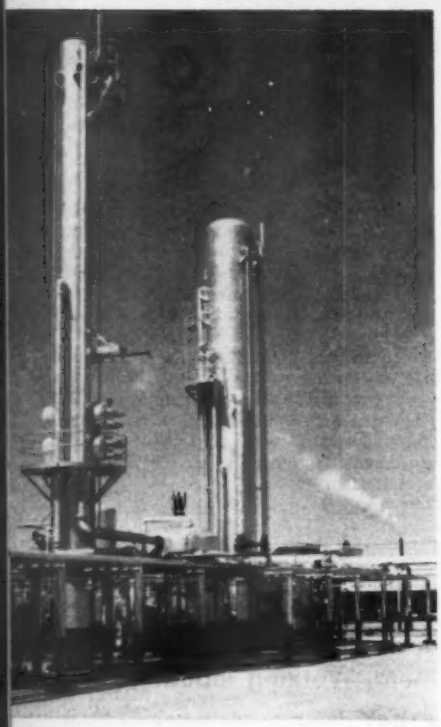


the weirs on the top tray. Apparently the corrosion was being caused by small streams of steam condensate impinging upon the metal as it flowed from the trays through weep holes into the downcomber to the tray below. Inspection revealed the area of corrosion was progressively smaller from the top tray through the third, but none was seen below the water-leg drawoff connection. As a repair job, the separate corroded areas were covered with a steel plate welded in place.

Efforts to Increase pH

Casting about to discover some immediately available means to increase the pH (4.5) of the condensate in the column, J. P. Magee, plant superintendent, reasoned that if some of the plant's available boiler blow-down water could be utilized, the pH of the condensate on the top three trays could be brought to a neutral point, or made slightly alkaline. Water from the continuous blow-down system from the plant boilers showed a pH of 11, although it contained sludge and was in no condition to be used without filtering.

Experiments in the plant laboratory indicated that the sludge could be removed without difficulty provided a filtering element which would not break down was used. Of the filtering materials tested, a Celotex element showed promise of handling the job at blow-down temperature and at pressures above 80 psig.

Construction of Filter Case

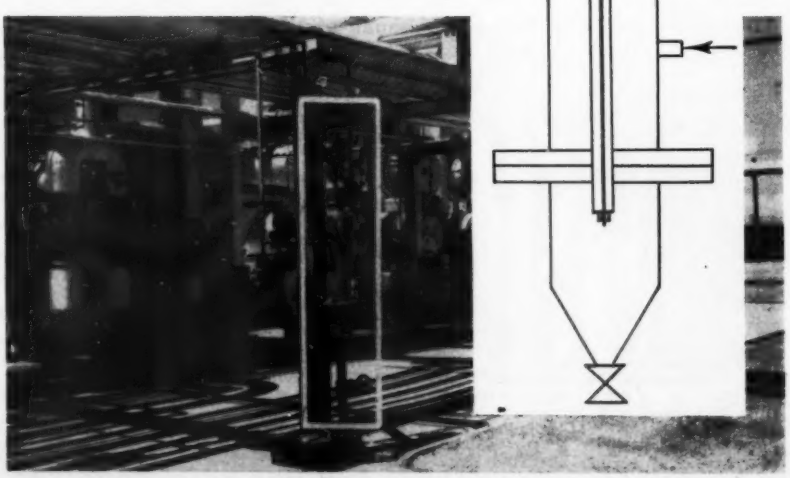
A filter case was constructed of 8-in. pipe in two parts joined with a flange to facilitate cleaning and filter replacement when necessary. The filter element was attached to the neck of the filter case in such manner that influent water flows through the walls of the element and out the top to a distribution line. The element hangs inside the case so that the unit can be backwashed to flush out accumulated sludge.

Boiler blow-down water is fed through ¾-in. pipe to the case at its side. Filtrate flows through a ½-in. line to the manifold on the vapor stripper reflux pumps. A needle valve is manually set to control flow of the filtered water to the column. The needle valve is only "cracked" to obtain sufficient filtered water blow-down to raise the pH of the water leg discharge from the previous valve of 4.5 to 7.5.

PROBLEM (Above): Severe corrosion in shell of vapor stripper of distillation column (pH of 4.5 for the steam condensate present). Caused failure in shell, opposite downcomer weirs on top three plates.

SOLUTION (Below): Boiler blowdown water, which had pH of 11, was feed in, to bring condensate mixture to neutral point, or slightly alkaline. But the proposed feed-in water contained undesirable sludge and solids. So a small pressure-type filter was constructed (see rectangle in photo, and drawing). With this operating arrangement, further corrosion was arrested.

Tower Corrosion Arrested With Boiler Blow-Down Water



OHIO OIL CO. engineers recently discovered severe corrosion of the shell of a vapor stripper in the natural gasoline-pressure maintenance plant at Coles Levee, Kern County, California. The plant has been operating for approximately 4 years, employing absorption for extracting liquids from the gas, and using high-pressure compressors to return the residue gas to the formation.

The corroded column is employed as a still, having a vapor stripper, or fractionator section atop the flash column. Process steam introduced into the bottom section of the column produces condensate which appears as liquid on the top three trays. This stream condensate is normally to a water leg for disposal.

Corrosion appeared on the exterior of the column as small holes opposite

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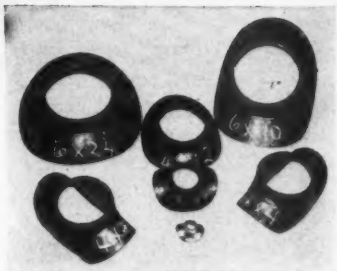

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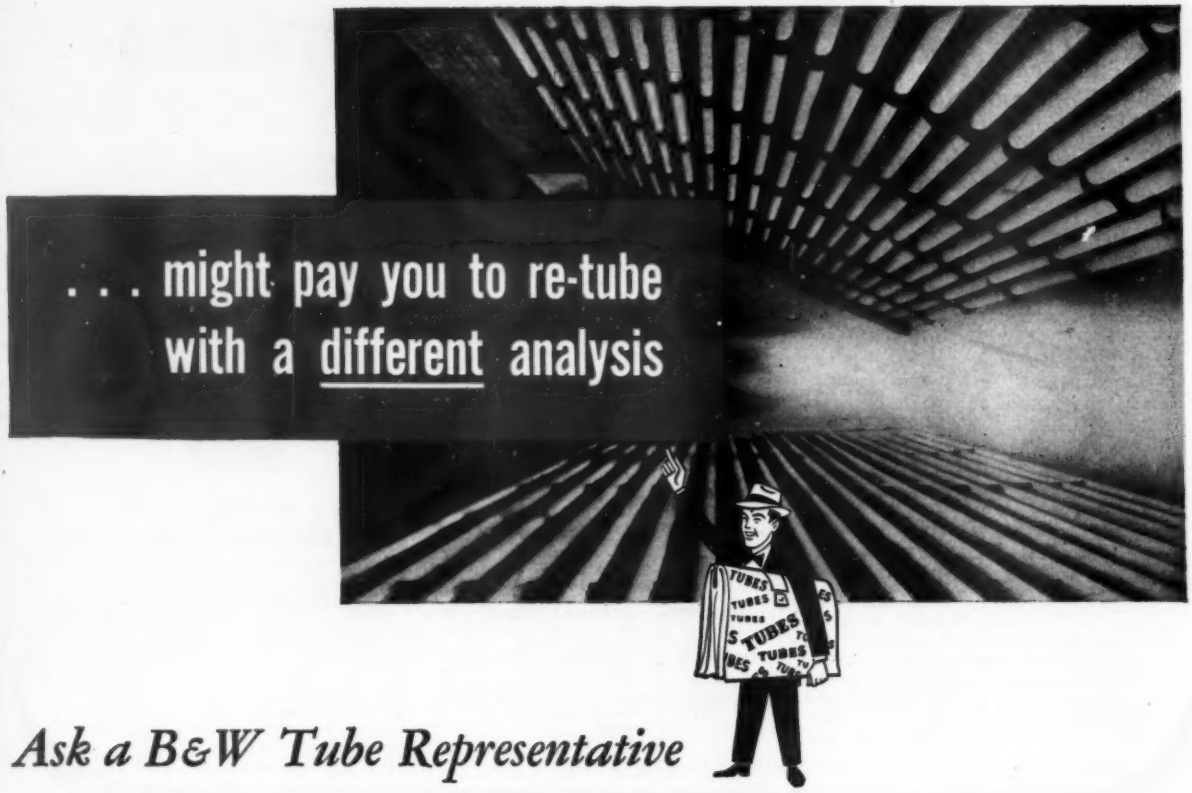

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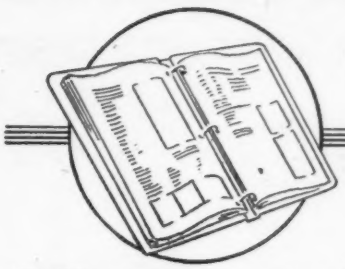


THE REFINER'S notebook

Adjustment of Proportional-Reset Controller

MUCH thought has been devoted by instrument engineers to obtaining optimum sensitivity and reset rate settings through relatively simple, time-saving procedures. Ziegler and Nichols[2] proposed such a procedure in terms of ultimate sensitivity (S_u) and the period of cycling at the ultimate sensitivity (P_u). Referring to Fig. 2 it will be seen that oscillations may be of increasing, constant, or decreasing amplitude. "Ultimate sensitivity" corresponds to a cycling record of fixed amplitude, while sensitivity adjustments greater or smaller than the "ultimate" will result in cycling with increasing or decreasing amplitude, respectively.

Optimum adjustments, using the ultimate sensitivity method are: (1) For proportional controllers, Opt. Sens. = 0.5 S_u, and (2) for proportional-reset controllers, Opt. Sens. = 0.45 S_u and Opt. Reset Rate = 1.2/P_u.

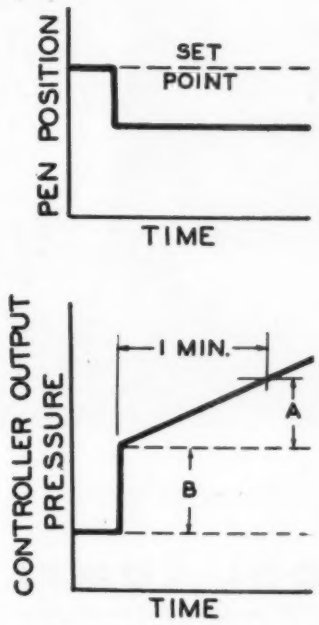


Fig. 1—The meaning of reset rate is illustrated here for a sudden change in set point position. Reset rate is defined as the ratio A/B per minute.

Amplitude ratio.—Ziegler suggests that in general optimum sensitivity is that corresponding to about 0.25 amplitude ratio. This may vary in more special cases within the limits from above 0.2 to below 1.0. The "amplitude ratio" (Fig. 2) is "the amplitude of one swing of the pen divided by the amplitude of the preceding swing, in the same direction," or the ratio B/A in Fig. 2. For fixed or constant oscillation the amplitude ratio is unity. Choice of amplitude ratio corresponding to optimum sensitivity involves consideration of the kind of recovery curve required for a particular process in terms of: (a) minimum cycling, (b) minimum deviation, and (c) minimum area under the curve. An application where minimum cycling would be desirable is that of liquid-level control on the reflux accumulator of a fractionating column feeding to a second column. In other applications minimum initial deviation might be the most critical factor. For the average process application minimum area is most desirable.

Proportional-reset adjustment.—the method mentioned in previous installment for optimum reset rate as outlined by Nuneviller and Vollrath[1] follows the original suggestion of Ziegler.[3] Based on the study of recovery curves obtained in many control application tests, Ziegler recommended as the optimum that reset rate which is the reciprocal of the cycling period for the recovery curve obtained at optimum throttling range and zero or minimum reset rate.

In summary, the steps followed in adjusting a proportional-reset controller are: (1) With reset rate at zero or at lowest possible value, the throttling range or sensitivity is adjusted as noted in Installment 33. (2) Optimum proportional band setting is made at around 0.25 amplitude ratio or as dictated by the particular application. (3) This setting is checked and the period of oscillation determined in minutes. (4) The reset rate setting is made at a value equal to the reciprocal of the cycling period. (5) The sensitivity is now checked again and final adjustments are made.

Nuneviller and Vollrath have tabulated the following proportional-band settings as suitable for the given applications: (a) flow or furnace pressure, 250; (b) temperature (pressure-type thermometer) and liquid level, 170; (c) temperature (electronic potentiometer), 100; and (d) pressure, 70. They have also suggested rough limits for the cycling period in minutes as: (a) flow, 0.1-0.4; (b) pressure, 0.2-1.0; and (c) temperature, 2.0-20.0.

References

1. Nuneviller and Vollrath, Instruments, July-August, 1945, p. 27.

2. Ziegler and Nichols, Trans. A.S.M.E., 64 p. 759 (1942).

3. Ziegler, Instruments, 16 p. 394 and p. 594 (1943).

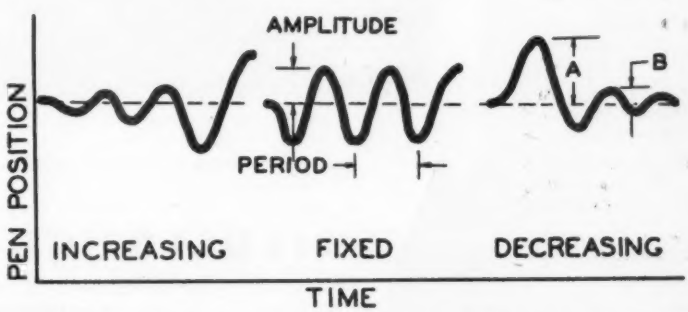
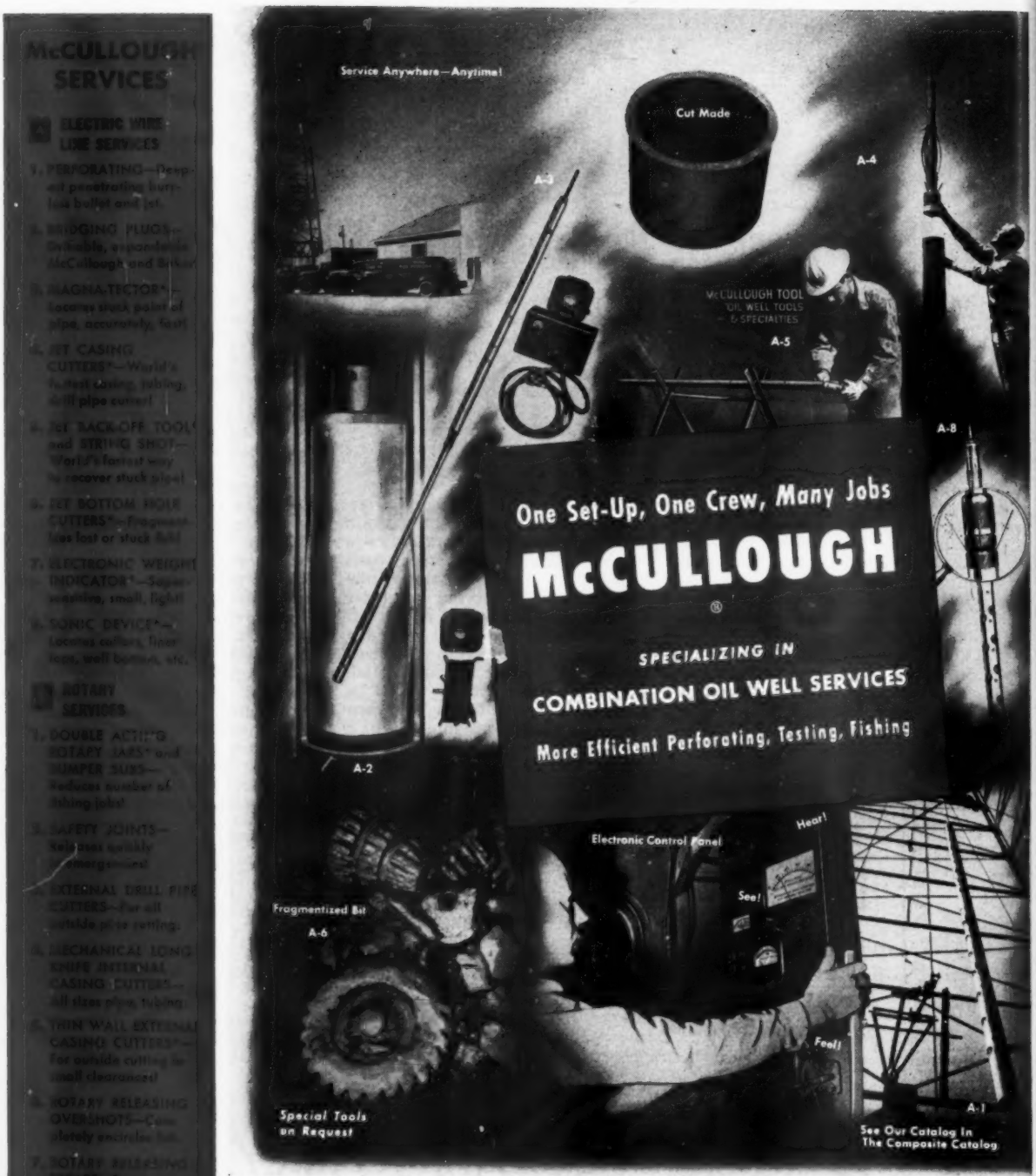


Fig. 2—Methods for obtaining optimum reset rate require determination of the cycling period (1) when cycling is constant (fixed amplitude), or (2) at optimum sensitivity setting.

No. 35 in current series. The Refiner's Notebook has been published continuously since 1944.



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XUM

ENGINEERING fundamentals

No. 415

The Water Transition Zone

THE present theory generally accepted for the occurrence of connate water in a reservoir is based upon the concepts of capillarity. Water supposedly occupied the reservoir first and oil entered to displace the water. Not all the water could be displaced by the oil because the displacing action could not overcome all of the capillary forces which held the water in. That water, therefore, which remained, and is now found today is attributed to the capillary character of the reservoir rock.

The theory requires that there shall be a balance between the gravitational and capillary forces in a reservoir as discovered today. The mathematical expression giving this balance is stated as

$$P_c = (\rho_w - \rho_o)\, hg \qquad (1)$$

where P_c is the capillary pressure at a given point in the reservoir, ρ_w and ρ_o are the reservoir densities of the water and oil respectively, g is the acceleration due to gravity, and h is the height in the reservoir above that reference plane where the capillary pressure is zero.

Although Equation 1 gives capillary pressure in terms of height, the relationship is of little consequence unless it can be made to yield a relationship with water saturation. The capillary character of the reservoir rock is given in terms of capillary pressure and water saturation (Engineering Fundamentals No. 328). A relationship of this nature is illustrated in Fig. 1. Curves similar to this are determined by most core laboratories.

Using Fig. 1 as a variation between P_c and water saturation and Equation 1 as a variation between P_c and height, water saturation can be computed in terms of height. Since Fig. 1 is not readily expressed in terms of an equation, values of height are merely substituted for values of capillary pressure by making the multiplication indicated in Equation 1. This has been done for a value of $(\rho_w - \rho_o)$ equal to 0.2. The value of $h = 0$ is at $P_c = 0$ where the value of water saturation is 100 per cent.

Inasmuch as the height versus water saturation curve represents the amount of water held by a balance between capillary and gravity forces, it will be possible to produce water if the capillary forces can be overcome by production pressure gradients. This is possible in the water transition zone. Therefore, any tests for production should show a water cut at any depth below that point, marked A, on Fig. 1, where the water saturation breaks away from the irreducible value.

The curve of Fig. 1 might be used to tell where to cement or perforate in a well and thereby prevent production of water, or could be used to tell how great an interval to allow for the water transition zone. Fig. 1 is not referenced with respect to well depth, however, but with respect to the 100 per cent water point. This requires the separate determination of the depth at which the water table (100 per cent) exists or of some other depth to correspond to a point on Fig. 1. A core analyzed for water content at some point in the transition zone would suffice, excepting that such coring to obtain accurate connate-water values is itself difficult. Production tests could be used to find the depth of zero water cut, but thereby one of the most useful applications of the technique is lost.

Furthermore, reservoirs are not uniform in pore character, and therefore, the capillary properties as shown by Fig. 1 will not necessarily apply to an entire reservoir. This means that the depth at which the water table exists and the thickness of the transition zone varies throughout the reservoir.

In view of these difficulties it becomes common practice to locate a water table and to compute transition-zone thicknesses from that point with a sufficient margin of safety to insure no production from the transition zone.

A more exact method of picking the top of the water transition zone (that depth where water saturations first start increasing above the irreducible) is available in the electric log. Because resistivity depends upon water saturation, the value of resistivity on the log should be more or less constant in the region of connate water irreducible. Fig. 2 is an ideal, schematic representation of variation to be expected as the water-saturation values change according to Fig. 1.

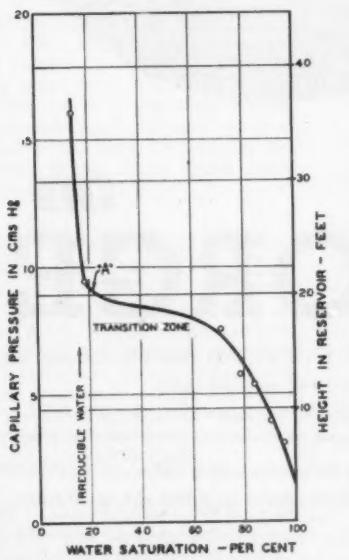

Fig. 1—Capillary-pressure curve converted to give height in reservoir versus water saturation.

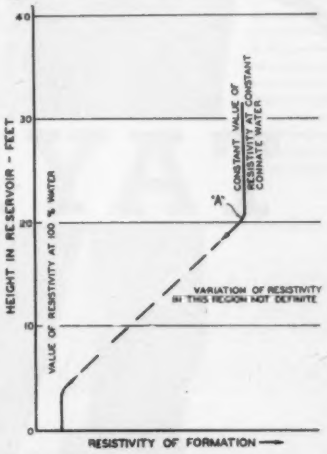
HEIGHT IN RESERVOIR - FEET
RESISTIVITY OF FORMATION
CONSTANT VALUE OF RESISTIVITY AT CONSTANT CONNATE WATER
'A'
VALUE OF RESISTIVITY AT 100 % WATER
VARIATION OF RESISTIVITY IN THIS REGION NOT DEFINITE

Fig. 2—Sharp break in electric-log resistivity to show top of water transition zone.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

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Whatever you seek on that next welded piping job...*speed*...*economy*...piping for *extreme conditions*...piping to withstand *corrosion*...you will find the answer to it in piping welded the WeldELL way.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 GUIDE TO STEEL SELECTION. a four-page bulletin lists all popular grades of hot rolled and cold finished carbon and alloy steel bars, giving principal characteristics, mechanical properties, and uses. It is intended to serve as a quick, convenient, and helpful guide to the selection of the most suitable as well as the most economical qualities of bar steel for the various jobs that come up. *Joseph T. Ryerson & Son, Inc.*

2 MERLA CATALOG 650. This 173-page catalog contains a discussion of modern techniques of gas-lift production, methods, and lifting principles. Has lift valves, surface controllers, packers, and accessory equipment shown in cutaway drawings with complete discussion of construction, operation, and use. A data section contains graphs and tables covering all aspects of gas-lift engineering. *Merla Tool Corp.*

3 PERFORMANCE CHARACTERISTICS. Identified as technical bulletin No. 105, this four-page engineering paper on small volume air-pressure regulation, defines the basic differences between flowing service and dead-end regulation and presents suggested tests, capacity charts, and other data to illustrate these statements. *Conoflow Corp.*

4 POLYPHASE ELECTRIC MOTORS. The bulletin, No. EM4-812, describes 1 to 75-hp., horizontal motors, illustrating construction details in cross-section and cutaway views. Among the features described in the bulletin are motor appearance, insulation, bearings, ventilation, mounting, service, frames and end bells, terminal box, rotors, and machining. *A. O. Smith Corp.*

5 HOSE COUPLINGS AND FITTINGS. The 12-page catalog section pictures and gives details on each type coupling and fitting, together with specifications, general and maximum pressure recommendations, and a description of threads. *B. F. Goodrich Co.*

6 JOY ELECTRICAL CONNECTORS. A new eight-page, two-color bulletin No. MC-108-2, illustrates and describes the standard line of molded neoprene-rubber electrical connectors and associate equipment such as lamp sockets, distribution centers, and vulcanizers. *Joy Manufacturing Co.*

7 PETROLEUM. Published as an investors guide, this 24-page, illustrated book includes a thorough study of profits, prices, and the major factors of supply and demand that affect the petroleum industry. It covers foreign oils and competing fuels, tells why weather is important, and why light heating oil is the industry's darling. *Merrill Lynch, Pierce, Fenner & Beane.*

8 CONTROL CORROSION WITH CARLON is an eight-page brochure illustrating the many applications in which Carlon plastic tubing and line

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Aug. 31, 1950

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OIL AND GAS EQUIPMENT Digest NEWS CHECK IT

pipe are particularly useful. Ease of handling and flow characteristics are featured. *Green Contracting & Engineering Co., Inc.*

9 INDUSTRIAL DENVER, a 24-page booklet, describes the advantages of Denver as an industrial city, ideal for location of new plants. Transportation, labor supply, fuel, water, and power supply, government, and market area are discussed. *Denver Chamber of Commerce.*

10 KAYLO HEAT-INSULATING BLOCKS describes a pipe insulation for pipe sizes from ½ to 72 in. and for temperatures up to 1,200° F. It is a calcium silicate material which is highly resistant to damage from water vapor or moisture. *Owens-Illinois Glass Co.*

11 BAKER CASING SCRAPERS is a 3-color, 24-page book describing the Model B rotary scraper and the Model C Roto-Vert scraper. Complete technical data are included on both models and engineers' drawings detail the construction. *Baker Oil Tools, Inc.*

12 BULLETIN 57B includes applications for a new self-bonding metallizing material, Sprabond Wire, which provides unusually long-wearing bearing surfaces. *Metallizing Engineering Co., Inc.*

13 CARMAN OIL-WELL CASING GAGE. This folder describes a compact, easy-to-carry and easy-to-use casing gage. Made of brass and stainless steel, it will not rust and can be read at a glance. Measures size and gages weight of casing per foot. Sizes 5½ in. through 13⅜ in. o.d. *Green Pipe & Supply Co.*

14 JVG GAS-ENGINE-DRIVEN COMPRESSORS contains a cross-sectional view and details pertaining to construction features as well as applications for which this packaged, angle-type gas-engine-driven compressor is adaptable. The unit is available in three sizes: 110, 165, and 220 hp. *Ingersoll-Rand Co.*

15 THE PRACTICAL WAY OF SOLVENT EXTRACTION, bulletin No. 12 is the first general publication on the patented York-Scheibel liquid-liquid extraction equipment. A complete description of the equipment is presented, a comparison between fractional liquid extraction and fractional distillation is made, and specific liquid-liquid extraction applications in the process industry are listed. *Otto H. York Co.*

16 STAINLESS STEEL VALVE, FITTING, AND ACCESSORY CATALOG. Complete in every detail, this attractive, 48-page catalog contains engineering drawings, weights, dimensions, size ranges, materials, corrosion data, nomenclature, and design information woven into an easy-to-read and easy-to-follow booklet. *Cooper Alloy Foundry Co.*

17 STEAM AND AIR TRAPS. This bulletin contains complete information on the steam and air traps, including capacity tables, sizing information blast trap attachment, double valve mechanism, and lists for the first time the Venturo-Valve. *C. E. Squires Co.*

18 FUNDAMENTALS OF LUBRICATING GREASES AND THEIR APPLICATION are covered graphically and colorfully in a new educational booklet. The basic theme of the booklet is its explanation of the scientific principles that make greases a separate category of lubricants. *Shell Oil Co.*

19 NEW SAFEWAY HAND HOISTS. This attractive red, gray, and black, six-page folder introduces the Safeway line. These new, compact, efficient hoists are available in capacities from ½ to 4 tons. The booklet includes such information as the complete specifications, action photographs, a cross-sectional view of the hoist, graphic illustrations of the hoist, and a listing of its features. *Wright Hoist Division of American Chain & Cable Co., Inc.*

20 P.I.V. VARIABLE SPEED DRIVES, available in 8 sizes and 16 types, in horsepowers of ½ to 25, with manual and automatic controls, are illustrated, listed, and described in a new 88-page book No. 2274. A special feature of the new book is the convenience with which a P.I.V. of the right specifications for a specific service may now be selected directly from its 36 pages of preselected drives. *Link-Belt Co.*

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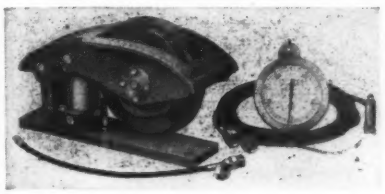
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller

21 THE MARTIN-DECKER HYDRO-MECH TORQUE GAGE for all rigs with chain-drive rotaries gives the driller a rugged, dependable instrument for indicating torque in the drill pipe. It instantaneously measures either the total torque or net-torque-on-bit at the driller's position. It operates on any type of power, internal combustion or steam, including diesel. Hydro-Mech saves chain, increases footage on deep wells, increases footage when drilling with small bits, and is indispensable for milling, cutting jobs, and diamond coring. Other advantages include remarkable sensitivity, ease of installation and of adjustment to any chain; easy to move from well to well, and can be furnished for single or double-link chain. *Martin-Decker Corp.*

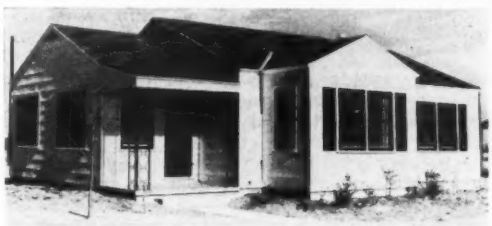


IT'S NEW CHECK IT

22 DRESSER-BOND greatly simplifies bonding of mechanical couplings on steel pipe lines. The kit, consisting of 50 preformed bonds, welders, flint gun, flash powder, metal disks, and coating compound for completing 50 bonds, employs a 5-second chemical welding method that any ordinary workman can use. The resistance of the bond is low and it retains its superior bonding properties permanently because a homogeneous weld area is attained and all surface control variables are eliminated. There is no danger of burning the copper wire, pipe, or inside pipe coating. *Dresser Manufacturing Division.*

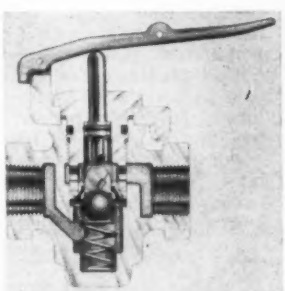
IT'S NEW CHECK IT

23 FIELD HOMES AVAILABLE ON LEASE-RENTAL PLAN. Industrial field homes can now be purchased on a new lease-rental plan. This plan will be interesting to companies who, because of tax structures, want to have the use of field homes without actually owning them. These houses are custom built in the conventional manner on a mass-production basis. Companies can choose from a wide variety of models and floor plans or the company's design can be used. This flexible service is designed to provide distinctive field housing to an even greater number of companies. *Whitmore Home Builders.*



IT'S NEW CHECK IT

24 SAMPLING VALVE. The stem is parabolic in shape and incorporates a predetermined fixed orifice which gives a smooth, even increase in flow as the handle is actuated to open the valve. The valve closes with a positive shut-off when the handle is released. Seat design embodies an exclusive feature of a triple seal which is responsive to hydraulic pressures. The rubber is bonded in the seat and communicates through several drilled holes to the inner seal that seals around the stem. Primarily, the outer seal prevents fluid leakage around the outside of the seat. The inside of the same seal prevents leakage around the ball. The third seal prevents leakage around the stem. *Page Oil Tools, Inc.*



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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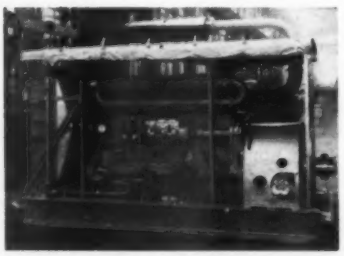
OIL AND GAS EQUIPMENT Digest

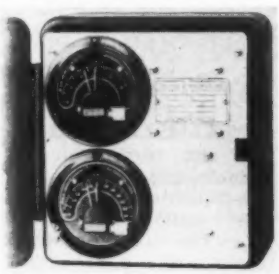
IT'S NEW CHECK IT

25 BRITISH DRILL-RIG POWER UNITS, especially designed to meet the arduous requirements peculiar to oil-well drilling, are powered by a naturally aspirated six-cylinder 200-b.hp. 1,200-r.p.m. diesel, having a bore of 6 in. and a stroke of 8 in. On site, installation work is reduced to an absolute minimum; the whole unit is completely self-contained and mounted on skids. A canopy and canvas side screens provide weather protection and the engine is fitted with efficient air filters to deal with dusty atmospheric conditions. Speed control of the unit is arranged so that it can be coupled directly to the drilling-rig control position. Additional shut-down gear is provided on the engine itself. Drive from the engine to the drill rig is transmitted through a hydraulic coupling. *English Electric Co.*



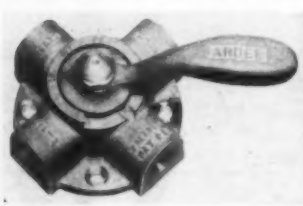
IT'S NEW CHECK IT

26 TYPE DU DUPLEX CYCLE TIMER, a combination of two timers built as one unit, will open and close one or two-load or control circuits either continuously, or permit the timer to perform only one complete cycle and then stop. Typical uses include the control of both idle and running time of a machine; to alternate automatically the operation of two motors as in a dual pumping installation; to control the period feeding of chemicals to boilers or to uniformly reverse gas flow. Two styles are available, one for intermittent duty having a clutch built within the motor itself and operated by a magnetic effect on the rotor; the second type suitable for continuous duty having a clutch consisting of two gear members actuated by a small electromagnet. *R. W. Cramer Co.*



IT'S NEW CHECK IT

27 MANUAL FOUR-WAY VALVE. These new units control 150-psi. air pressure, and handle liquid pressures up to 1,000 psi. Available in pipe sizes from ¼ to ¾-in. A tubular sealing member slides over the peripheral surface of a rotor, maintaining intimate contact during operation of the valve. Pipe scale and foreign material in the line cannot lodge between sealing surfaces, due to wiping action of the sliding seal. Valve bodies, depending on service, are furnished in aluminum or brass, and the tubular sealing members are molded of various resilient materials suitable for the service requirements. The controlled degree of softness assures a tight seal against the curvature of the mating surface. *Barksdale Valves.*

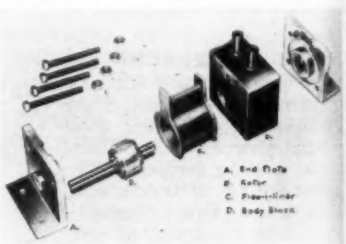


IT'S NEW CHECK IT

28 MORRIS PIPE COUPLINGS are now available for pipe sizes up to 8-in. In addition to the standard zinc-coated steel line, all aluminum couplings are available in all sizes to 8-in. Couplings are used permanently joining either plain end or threaded pipe or a combination of the two. The pipe coupling serves to hold the entire surface of the joint in compression. The coupling is easy to apply with a socket or crescent wrench and gives each joint the advantage of a pipe union. Rubber-base gaskets are furnished as standard equipment, but gaskets of various types such as cork, fiber glass, and neoprene are also available. *Morris Coupling & Clamp Co.*

IT'S NEW CHECK IT

29 VANTON NONCORROSIVE FLEX-I-LINER PUMP in which the transferred liquid or gas never touches any of the metal parts, is ideally adaptable for the handling of liquefied petroleum gas or contaminating or corrosive liquids such as acid, alkalies, and industrial alcohols. Construction of the pump is such that the fluid or gas flows on the outside of the Flex-i-liner and on the inside of the body block. The Flex-i-liner material can be specified in either a pure gum rubber or a synthetic rubber, depending upon the particular application, while the body block is manufactured of special corrosion and abrasion-resistant bakelite. An eccentric rotor mounted on a ball bearing rides inside and activates the Flex-i-liner. *Vanton Pump Corp.*

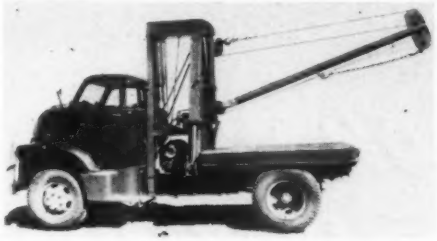


IT'S NEW CHECK IT

30 GREASE-PAIL CRIMPER. A machine for automatically crimping the lid on grease, paint, and other viscous-liquid containers is made for use on all sizes of pails with removable tops. Crimper is designed to handle up to 720 pails per hour with little or no manual labor, and when used in conjunction with an automatic filler takes over completely filling, crimping, and batch stamping of entire output. Filling machine is designed to handle up to 900 pails per hour and ejects pails onto rollers leading to crimping machines. *Barrett Manufacturing Co.*

IT'S NEW CHECK IT

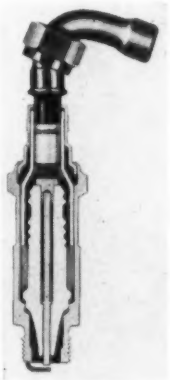
31 HYDRA-LIFT is a new mobile truck crane that can be easily installed on any type of truck and used with any make winch. Because of its simple design, and because it makes use of hydraulic power, it is less expensive to maintain. Smooth, positive hydraulic action



enables operator to pick up and set down loads exactly where he wants them. The boom swings in 180° arc and can be telescoped from 11 to 20 ft. Adjustable in height to allow for uneven terrain, outriggers give truck extra support when lifting over the side. Capacity of Hydra-Lift varies from 6,000 lb. with the boom at 11 ft. to 2,500 lb. with boom at 20 ft. *Pitman Manufacturing Co.*

IT'S NEW CHECK IT

32 WATERPROOF AND EXPLOSIONPROOF ASSEMBLY permits standard automotive-type ignition cable to be connected to shielded automotive and industrial-type spark plugs. The assembly, easily fitted, consists of a terminal sleeve, a rubber grommet, a brass bushing, and a ¾-in. brass nut having ⅝-in. 24 threads. The design of the grommet and bushing precludes any water from settling around the connector and the grommet extension helps eliminate sharp bends and the resulting breaks in the insulation of the ignition cable near the spark plug. Shielding barrel extensions, zinc plated for corrosion resistance,

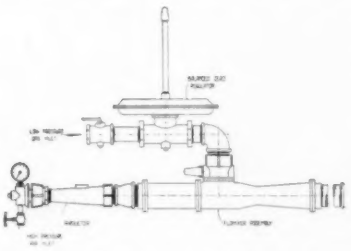


are for use in large industrial-engine installations where it is necessary to keep ignition cable out of high-temperature zones. Use of a Champion-Ceramic terminal extension in this assembly insures the highest dielectric and mechanical strength. *Champion Spark Plug Co.*

IT'S NEW CHECK IT

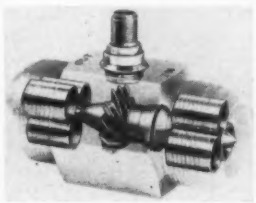
33 STAINLESS-STEEL BELLOWS are available in a complete range of sizes. They are ideally suited where problems of pressure, high and low temperatures, and corrosion are factors. They are especially suited for applications of control devices and instrumentation, such as regulators, valves, steam traps, shaft seals, expansion connections, and flexible connector for misalignment. They are manufactured in single and multiply construction and various lengths, dependent upon application requirements. Bellows or bellow assemblies with standard fittings or fittings to customer's specifications can be supplied. Fitting attachment may be attached by electrical circular seam welding to assure leakproof unimetal assemblies. *Chicago Metal Hose Corp.*

34 INDUSTRIAL AIR DUCTOR is a device for producing large volumes of low-pressure air up to 1 lb. using high-pressure compressed air as a power source. The Air-Ductor is recommended for use in installation where the low-pressure air usage is infrequent. It is easily installed and simple to operate. High-pressure air consumption will average 25 to 35 per cent of the volume of 16-oz. pressure air produced and will decrease with lower delivery pressures and higher compressed air pressures. Supplied with outlet connection sized correctly to minimize pressure losses. The assembly includes high-pressure needle valves and pressurge gages. *Bryant Industrial Division.*



IT'S NEW CHECK IT

35 POTTER ELECTRONIC FLOWMETER incorporates a high-efficiency sensing rotor which spins freely within a venturi, eliminating bearing maintenance, friction drag, and high-pressure drop. Housing of the sensing unit is no larger than the line into which it is installed. Three circular spring clips at each end maintain the guide bearings for the rotor shaft in center. Fluid passing through the housing turns the rotor at a speed determined by velocity of the liquid and pitch of the rotor blades. A cylindrical permanent alnico magnet within the rotor sets up a rotating field which generates a.c. current in the pickup coil. *Potter Aeronautical Co.*



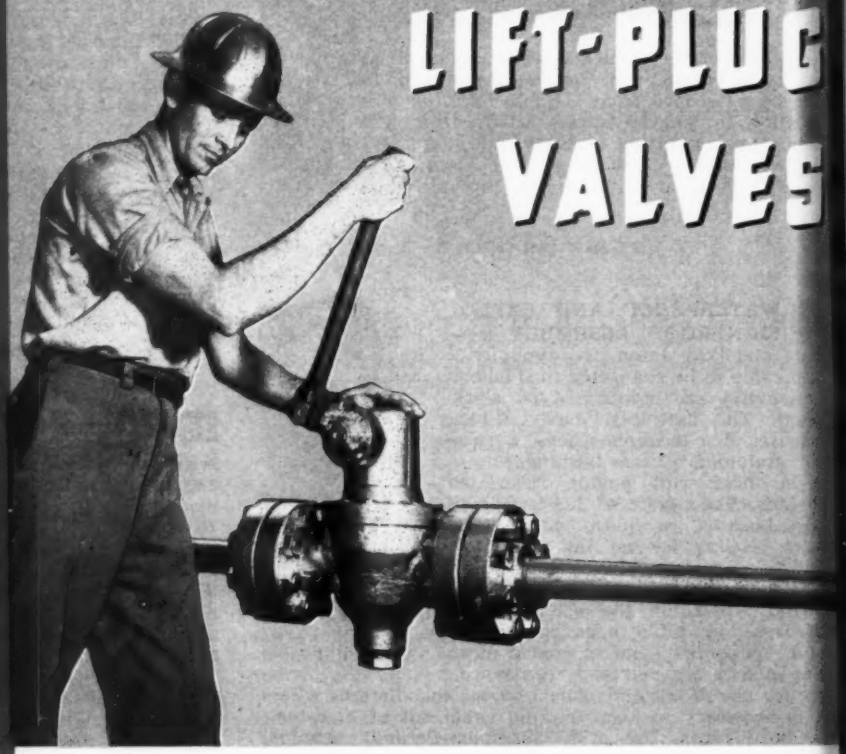
IT'S NEW CHECK IT

36 TRI-CLAD SINGLE-PHASE MOTOR. For use where a constant-speed, high-torque, single-phase motor is required in large ratings, a new repulsion-induction motor combines the high starting torque of the repulsion motor with the constant-speed characteristics of the induction motor. Designated as type SCR, the motor is available in 5, 7½, and 10-hp. ratings, all at 1,800 r.p.m. The motor is of the open (dripproof) type, and construction affords triple protection against physical damage, electrical breakdown, and operating wear and tear. *General Electric Co.*

IT'S NEW CHECK IT

ELIMINATE VALVE LUBRICATION EXPENSE AND BOTHER

Cameron NON-LUBRICATED LIFT-PLUG VALVES



THE BEST FEATURES OF PLUG AND GATE VALVES COMBINED WITH NEW CAMERON INNOVATIONS

- NON-LUBRICATED — no grease of any kind required to effect a seal; also reduces chance for human error and need for maintenance.
- PRESSURE SEALING—when plug is seated, line pressure automatically forces seat into tighter engagement with plug.
- UNIQUE LIFT-PLUG ACTUATOR—a novel mechanical design which lifts, turns and reseats plug in continuous turn of a lever.
- RENEWABLE SEAT AND PLUG—easily replaced; permits any desired trim.
- FIELD REPAIR — can be completely overhauled without removal from line; no special tools or skill required.
- EASY OPERATION — requires less operating effort than other valve designs.
- FORGED STEEL—all parts, including body, are press or drop forged from specification materials.

Body distortion will cause most conventional valves to leak because the sealing surfaces tend to separate under the action of pressure forces and line strains. To bridge this separation of sealing surfaces, a viscous lubricant is usually injected into the valve, resulting in high material and labor costs in order to maintain proper functioning.

The Cameron "LP" Valve functions properly and seals without lubrication of the sealing surfaces due to the novel design which incorporates a separate seat and which is not attached to the body. Obviously, body distortions cannot affect the sealing efficiency because they cannot be transmitted to the seat. As a matter of fact, line pressure acts on the seat itself to improve the sealing contact between the seat and plug.

Completely descriptive literature and dimensional data will gladly be sent to interested operators upon request.

Cameron IRON WORKS, INC.

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Export: 74 Trinity Place, New York, N. Y.

XUM

PIPE LINES

Products Session

A.P.I. group will hold symposiums in St. Louis

NEW developments and techniques in the operation of products pipe lines will be reviewed during a 3-day conference to be held on September 11, 12, and 13 at the Hotel Lennox in St. Louis, Mo. The convention will be sponsored by subcommittee on products pipe-line technology of the Division of Transportation of the American Petroleum Institute, led by J. W. DeGroot, president of Tuscarora Oil Co., Ltd., Harrisburg, Pa.

Symposiums will be held during the first two days and the third day will be taken up with a field trip to four pipe-line stations in the vicinity of St. Louis.

Speakers before the symposium on operations of pipe-line pumping stations will include H. E. Fisher, Chicago, Standard Oil Co. (Ind.), who will speak on fully automatic stations; R. F. Hadley, Philadelphia, Susquehanna Pipe Line Co., who is to analyze semiautomatic stations; and S. S. Smith, New York, Shell Oil Co., who will describe remotely controlled stations.

Other topics to be discussed in the symposiums include metering practices, economics of pipe-line design, products-pipe-line hydraulics, diesel versus electrically operated units, use of inhibitors, line repair, and fire-fighting equipment.

A feature of the convention will be a seven-man panel. Members will be L. S. Wrightsman, Humble Pipe Line Co.; L. A. Baxter, Keystone Pipe Line Co.; D. C. Glass, Pure Oil Co.; S. S. Smith, Shell Oil Co.; J. E. Ford, Susquehanna Pipe Line Co.; C. C. Keane, Great Lakes Pipe Line Co.; and W. G. Horstman, Plantation Pipe Line Co.

Mid-Valley Moves Office

Mid-Valley Pipe Line Co. is moving its home office from St. Louis, Mo., to Longview, Tex. The transfer will be made on or before October 1 according to the announcement made by William C. Kinsolving, chairman of the board of directors. The new Longview headquarters will be in the Bramlette Building.

Longview is the lower terminal of Mid-Valley's 1,000-mile pipe line to Lima, Ohio. Built at a cost of approximately $56,000,000, the line is now nearing completion. Sun Oil Co. and Standard Oil Co. (Ohio) jointly own the line which will have a capacity of 150,000 bbl. of crude oil daily.

Service Lays Wyoming Line

Service Pipe Line Co. is laying a 25-mile, 8-in. crude-oil line to serve the Beaver Creek and Riverton, Wyo., producing areas. The project also includes 8 miles of 3-in., 4-in., and 6-in.

GAS FOR ATOMS.—A gas line to supply the plant of the Atomic Energy Commission at Oak Ridge, Tenn., is being laid by East Tennessee Natural Gas Co. This shows coating and wrapping operations of Walters & Saigh Construction Co. on the Athens-Oak Ridge section of the line.

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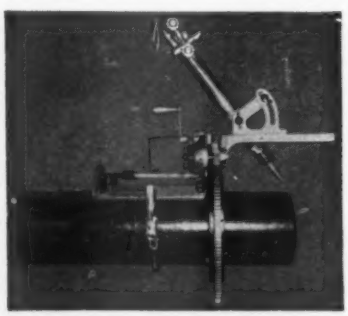

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SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.
ECONOMY: Save approximately one-half labor and gas costs.
PORTABILITY: Can easily be carried from one pipe section to another.

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The H & M
Pipe Beveling Machine Co.
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gathering lines. Work was started by the contractor, Vaughan & Taylor Construction Co., on August 17 for completion scheduled within 3 weeks.

Ground-Breaking Ceremony

HOUSTON.—With prominent oil officials present, ground-breaking ceremonies were observed this week for the new 30-in. natural-gas pipe line which Texas Illinois Natural Gas Pipeline Co. is building from the Texas Gulf Coast to the Chicago area.

Actual digging on the 1,331-mile high-pressure transmission line got under way when trenching machine began carving out the 3-ft. trench to accommodate the first 40-ft. length of large-diameter pipe. The ground was broken near Wharton, 50 miles southwest of Houston.

Taking part in the ceremonies were James F. Oates, Jr., chairman of Peoples Gas, Light & Coke Co., Chicago, and chairman of Texas Illinois; Joseph J. Hedrick, president, and Mark V. Burlingame and Clayton Holmes, vice presidents of Texas Illinois.

The new pipe line will extend into the Chicago region, with an initial capacity of 305,000,000 cu. ft. of natural gas daily. With additional compressors, the line will have an ultimate capacity of 500,000,000 cu. ft., making a new source of gas available to the Chicago metropolitan area. The line will also serve gas utilities in Illinois, Indiana, Iowa, Kansas, and Nebraska.

Gas for the initial supply will come from La Gloria, Von Blucher, Chocolate Bayou, and Old Ocean fields in the Gulf Coast area. The beginning point of the line lies less than 100 miles from the Rio Grande River. The section from the Von Blucher and La Gloria fields will be 26-in. in diameter, joining at Wharton with a 24-in. line which will feed in the supply from Old Ocean and Chocolate Bayou fields.

Key Turned on Pipe Line

Arkansas-Louisiana Gas Co. has placed in service its 163-mile, 20-in. natural-gas pipe line from Waskom area of Harrison County, Texas, to Perla, Ark. Construction costs of the line were approximately $8,000,000.

The firm now is constructing a compressor station near Blanchard, La., to be named in honor of W. H. Buckley, superintendent of the gas pipe-line division and a 40-year veteran in the company's service. Three compressors are being installed, with plans to add two more in 1951.

New Scurry Line

Texas-New Mexico Pipe Line Co. has awarded a contract to O. H. Burden Construction Corp., Tulsa, to

Michael J. Baker, Jr., Inc.
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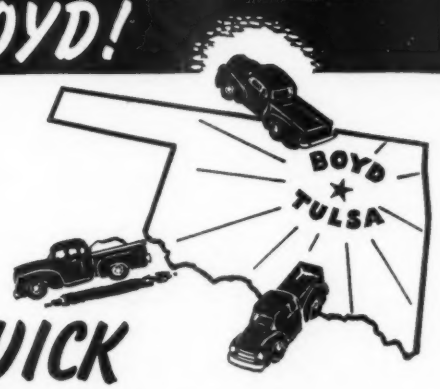

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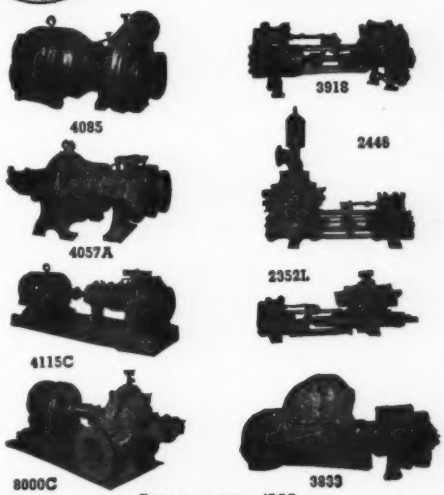

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construct approximately 16½ miles of 10¾-in. crude oil pipe line in Scurry County, Texas.

The line is being constructed to provide additional capacity to move increased production from the Diamond M and Sharon Ridge pools in Scurry County. It will begin at Colorado City station of the Basin Pipe Line System and will extend westward to connect with lines extending from the two pools. Work will be started immediately, and the line is scheduled to be placed in operation by September 15.

Mid-Valley Pumps Oil

Mid-Valley Pipe Line Co. is starting pumping operations at the Haynesville, La., and Mayersville, Miss., stations, according to Edward F. Morrill, president. The 1,000-mile, 20 and 22-in. Mid-Valley system from Longview, Tex., to Lima, Ohio, is completed with the exception of a 5-mile gap near Salt River, Kentucky, which is now being finished. It will take about 3 weeks to fill the line with crude oil which displaces water now in the system for testing purposes. Some deliveries of crude oil will be made to the Lima terminal in September but regular secheduled shipments will not be under way until October 1.

New Colorado Project

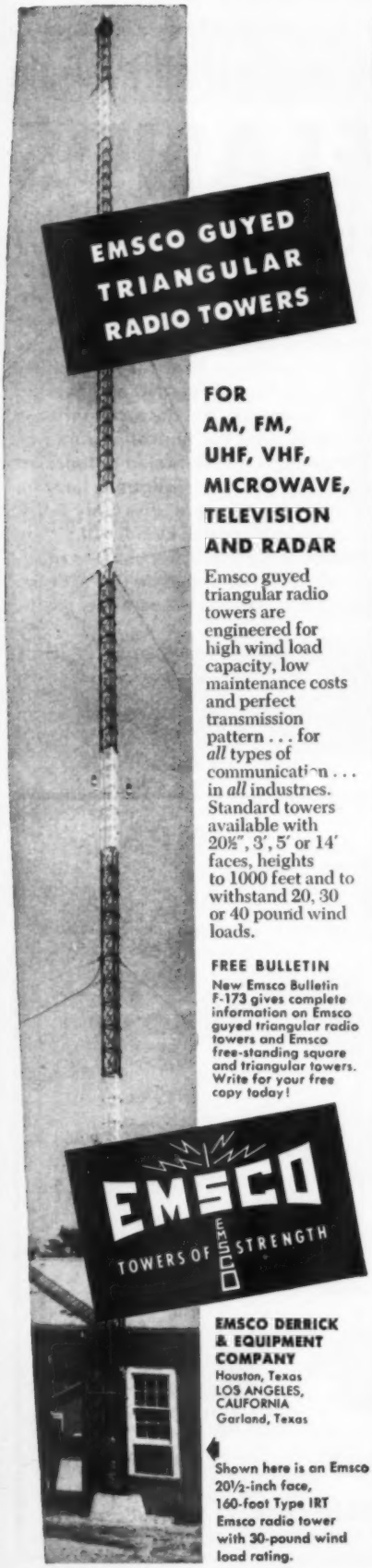
A remote gas field in Colorado is to be serviced with a new pipe line which General Petroleum Corp. is projecting with M. B. Garman, a natural-gas pipe-line operator, and Public Service Co. of Colorado. Plans are announced for forming a new company to be known as Grand Valley Pipeline Co.

Each of the parties will have a one-third interest in the new company which will build and operate a natural-gas pipe line from Pinceance Creek natural-gas field to communities along the Colorado River.

Grand Junction, Colo., is the largest of the communities to be serviced, having no natural gas supply at present. Population now is 14,000.

An initial plan for the pipe-line route directs it along existing highways which link Rio Blanco, a town near Pinceance Creek field, with Rifle and Grand Junction. Contracts have been signed providing for sale of General Petroleum's natural gas to the new company, and for sale of gas by the latter to Public Service of Colorado for distribution on a retail basis.

P. S. Magruder, executive vice president of General Petroleum, will be president of the new company. Garman will be vice president and secretary, and F. T. Parks, vice president of Public Service, will be vice president and treasurer.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Attorney and Pipe-Line Right-of-Way Supervisor

who expects to be available for employment on or about October 15 is seeking a position as Manager of Right-of-Way and Claims Department, or will accept Title work. References furnished on request. Write

E. P. C. Moss

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smooth throttling—The long life of the new W-K-M Ball Valve in high pressure corrosive and erosive throttling applications has proved its superiority. Smooth flow around ball and its straight line discharge characteristics make it the ideal throttling valve.

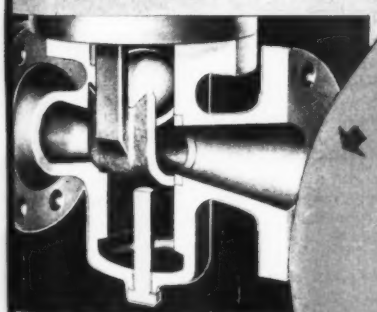
straight-through flow—Wide open flow is unobstructed, non-turbulent with negligible pressure drop. Full flow is approximately double that of a globe valve.

self-cleaning and purging—Due to the venturi design, liquids or gases passing through valve suck out dirt, scale, sediments. There are no corners, passages in which solids or sediments might be trapped.

easy to open and close—The ball rolls. No appreciable sliding friction. Wedge pads on yoke make valve remarkably easy to open even under adverse conditions.

long life—The ball seats in a different position each time, thus distributing wear over its entire surface, and preventing uneven wear of seat. Valve may be reversed in the line to double its life. Smooth flow minimizes erosion.

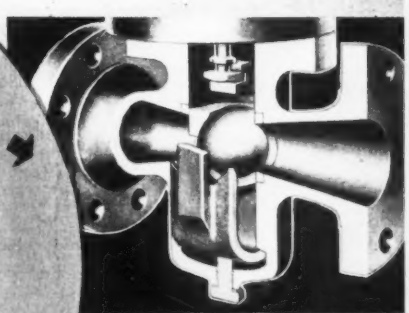
Operation of the W-K-M Ball Valve



WIDE OPEN
All parts are out of stream—giving straight through unobstructed flow. Yoke member straddles stream and cradles the precision-ground ball.

THROTTLING
In any midposition the ball presents a smooth surface. Non-turbulent flow over a wide range is possible without destructive erosion or wire drawing. Bernoulli effect constantly holds ball firmly against fingers, maintaining throttling position without chatter.

TIGHT CLOSED
Turning hand wheel moves the stem inward, closing the W-K-M Ball Valve. The ball guide, fixed in the valve body, directs the ball into the seat. Locking wedge, moving with the yoke, seats the ball tightly, regardless of pressure and flow conditions. Line contact with high unit pressure between positioned ball and seat assures drop tight, absolute shut-off.



The W-K-M Venturi Ball Valve is the most versatile of general purpose industrial valves and has proved its superiority in hundreds of challenging applications. Write for Bulletin 695 which describes more fully the many engineering advantages of this outstanding new valve.

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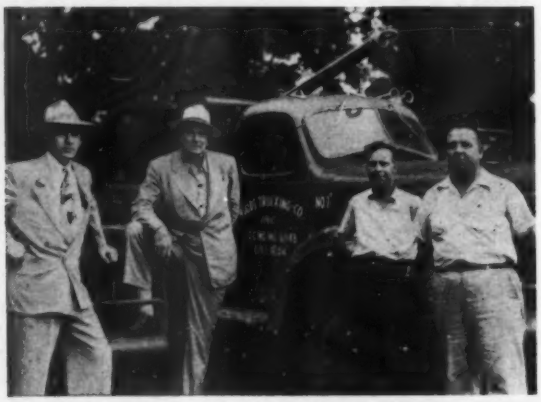

Left to right the names of the men in the picture are: E. S. Heaton, Factory Representative of Champion Products, Inc.; Col. C. F. Gilchrist, Vice-Pres. of Woods Trucking Co.; R. E. Sutherland, Chief Mechanic; Roy Underwood, Supt. of Transportation.

Coyle, Okla.
July 25, 1950

Champion Products, Inc.
E. S. Heaton, Factory Rep.
Box 5145, Okla. City, Okla.

Dear Mr. Heaton:

As you know we operate seventeen trucks in our oil field trucking business throughout the states of Kansas, Oklahoma and Texas. We have in our fleet Cummins Diesel, Mack Diesel, Internationals, Ford gas motors and an International Bulldozer.

The dependability of these trucks and other equipment is the difference between profit and loss. I am glad to tell you that we have not had one case of stuck rings or valves, and we have not had any vapor locks since we began using your Champion Q.X.

It has definitely increased our gasoline mileage. As you once told me "It is not a miracle oil", but it certainly will do all you claim it will do.

I will gladly recommend your Champion Q.X. oil to any one operating motors in any type installations, oil field or other uses of gasoline, diesel, natural gas, or butane burning motors.

Please send me another 30 gallon drum in care of the Woods Trucking Company at Coyle, Oklahoma. A purchase order will follow upon receipt of invoice.

Your truly,
R. E. Sutherland
Chief Mechanic

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Heard & Silvey Service & Equipment Co., 1040 Marshall St., Shreveport, La.
G & B Distributing Co., Box 3386, Whittier Square, Tulsa, Okla.
Factory Rep.: E. S. Heaton, Box 5145, Oklahoma City, Okla.
Heard & Silvey Service & Equipment Co., Box 866, Snyder, Texas. Local Rep.—Mr. Harry Lewis.
All American Trading Co., Managua, Nicaragua, C. A.

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THE ENARDO "MB" TIME CYCLE SWITCH
An accurate micro-switch control mechanism for all types of electrical circuits. Operates on either open or closed circuits. This hand wound clock mechanism has proved its economical efficiency in field operation of remote pumping engines. The non-arcing, vapor tight switch has a normal operating capacity of 60 Watts D.C., 1250 Watts A.C.

THE ENARDO "W" CLOCK SHUT-OFF VALVE
The Enardo "W" is ideally suited for any liquid or gas flow lines where line pressures do not exceed 100#. Cast iron . . . stainless steel trimmed . . . a dependable clock mechanism that is protected by a dirt, moisture, and vapor resistant case. Pays for itself by slicing return trips.

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A companion switch to the "MB" series, the Enardo "A" employs a mercury tube switch operation in place of the micro-mechanism. Available in 12 and 24 hour settings the "A" series is of the single circuit type, rated at 4 Amps., 115 V., either AC or DC. For more detailed information on any of the above items write Enardo, Box 1647, Tulsa.

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ACCURATE — Every thread is clean, perfect. Meets API standard. Counting flashes from red blinker light insures standard length threads.

FAST — The 44 is the ONLY threader that has the patented automatic chucking. This is the most important time saving feature on any threading machine. Check the time tables below, and remember these figures include chucking, unchucking, reaming, threading and cut-off.

Pipe Size	Floor to Floor
½"	16 sec.
¾"	16 sec.
1"	19 sec.
2"	27 sec.
2½"	35 sec.
3"	43 sec.
4"	76 sec.

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Among the Drilling Contractors

Safe-Practice Manual For Drilling Industry

A manual on safe practices for drilling operations has just been issued by the Bureau of Labor Statistics, State of Texas, and is available upon request from R. B. Latting, state safety supervisor, Austin.

The manual, in printed booklet form, embraces a compilation of definite recommendations for safe practice in drilling. It has been designed for practical use by drilling contractors, toolpushers, drillers, safety engineers and others directly concerned with elimination of hazards and prevention of accidents in drilling.

George Puckett Drilling Co., Wewoka, Okla., is making hole for E. C. Clay & Son, Oklahoma City operators, at 1 Good, SE SE NW 3-11n-5e, a projected 5,000-ft. wildcat test southwest of Prague, in Pottawatomie County, Oklahoma.

Vernon Whitely Drilling Co. has a rig working on a 6,000-ft. Paluxy sand wildcat test being drilled just north of Omaha, Morris County, East Texas. The test is Andrew V. Erwin 1 G. W. Apperson Estate. Location is in the J. R. Slaughter Survey.

Service Drilling Co., Tulsa, has moved a rig to a wildcat located between Boise City and Kenton, in Cimarron County, Oklahoma Panhandle, where it has a contract for a 5,000-ft. test to be drilled for Gilcrist & Brumme. Location for the test, 1 Brumme, is in the NE NE NE 12-5n-3eCM.

Hancock Drilling Co., Houston, has a rig running in the Marsha field, 7 miles west of Bastrop, Bastrop County, South Texas. It now is drilling 1 Frank Moore, L. Leverenz Survey.

Mountain States Drilling Co. has a 5,000-ft. job under way southeast of the Cisco field, Grand County, Utah, where it is drilling for Equity Oil Co. at 1 Government, C NW SW 20-1s-23e.

Fleet Drilling & Producing Co., Ada, Okla., is drilling for Bay Petroleum Co. at 1 Payne, a projected 8,500-ft. test located about 1½ miles southwest of the Doyle townsite on the northeast flank of the spotted Doyle producing district, Stephens County, Oklahoma. Location is in the SW SW SW 1-1n-5w.

B. N. Fallis, San Antonio, is drilling a projected 3,200-ft. wildcat test for Louis J. Roussel at 1 Pedro Leal, in Survey 66, 9 miles north of Bruni, Webb County, Southwest Texas.

Fred M. Manning, Inc., Denver and Fort Worth, has the contract for Tide Water Associated Oil Co.'s first test on its 118,000-acre block in East Central Dickens and West Central King counties, West Texas. The proposed reef wildcat test is to be 1-B Pitch-

Time out for a picture on derrick floor of a well Ray-Harris Drilling Co., Dallas, is drilling for Sun Oil Co. along the reef trend in Kent County, West Texas. Left to right: Fred Warden, driller; J. R. Hudson, Jerry P. Helms, J. J. Blalock, and John Jenkins, crewmen; and Fred Roady, Rotary Engineering Co., Midland, Tex., mud engineer.

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Plus 20% Excise Tax
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fork Ranch, with location in Section 143, BS&F Survey, King County. It is about 12 miles northwest of Guthrie.

Mora Drilling Co., Tulsa, has contracted for the drilling of a wildcat test for W. H. Elson at 1 Cameron, SW SW NE 18-20n-6e, 2 miles southwest of Maramec, Pawnee County, Oklahoma.

Delta Drilling Co., Tyler, Tex., has the contract for a projected 8,500-ft. wildcat test being started by The Texas Co. about 8½ miles southeast of Silverton, in Central Briscoe County, Texas Panhandle. The location is on the Adair Estate in Section 50-E2, D&SE Survey.

Jackson Drilling Co., Wichita, is drilling a test a mile west of the Dopeta pool, Central Rooks County, Kansas, for Westgate-Greenland Oil Co. Location is on the Ruder lease in the SE NE SW 35-8-18.

Hollandsworth Drilling Co., Longview, Tex., is starting another well for its affiliate, Hollandsworth Oil Corp., in the Earl Lee Field, 4 miles southeast of Pine Mills, Wood County, Texas. Current operation is 4-B Schenewerk, in the William Fisher Survey.

Cooper-Herring Drilling Co., Tyler, Tex., is both the contractor and joint operator with E. L. Howard in the drilling of a wildcat test, 1 Clewis, located in the A. Hendley Survey, about 9½ miles east of Slocum, Anderson County, East Texas. The test is projected to a depth of 5,700 ft. with the Woodbine sand as its objective.

Altus Drilling Co., Oklahoma City, has moved a rig to a location 3 miles northeast of Bliss, Kay County, Oklahoma, where it is starting drilling on a contract with Ashland Oil & Refining Co. for a 4,700-ft. test. Location is in the NW SW SW 31-25n-2e. The test is 1 Jueschke.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 8-21-50	Change week ended 8-14-50	Change week ended 8-22-49
Gulf Coast	516	— 9	+ 2
W. Tex.-N. M.	741	— 5	+198
Ark.-N. La.-E. Tex.	156	+ 3	— 10
Oklahoma	312	+18	+ 79
Kansas	113	— 7	+ 9
Illinois-Eastern	133	— 4	+ 7
Rocky Mountains	121	+14	+ 13
Pacific Coast	135	— 3	— 34
Total United States	2,227	+ 7	+264
Western Canada	89	—16	+ 16
Total	2,316	— 9	+280

*Courtesy Hughes Tool Co. Trends in drilling activity for the United States and the Rocky Mountain and western Canada areas are shown by charts on pages 128 and 129.

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Patented dark chamber holds comparison test tubes, solid particles, loose sands, free mud for ultraviolet inspection at 2537 or 3660 Å. Portable—weighs less than 2 pounds Power supply—two standard flashlight batteries. At your dealer's or write for detailed data.

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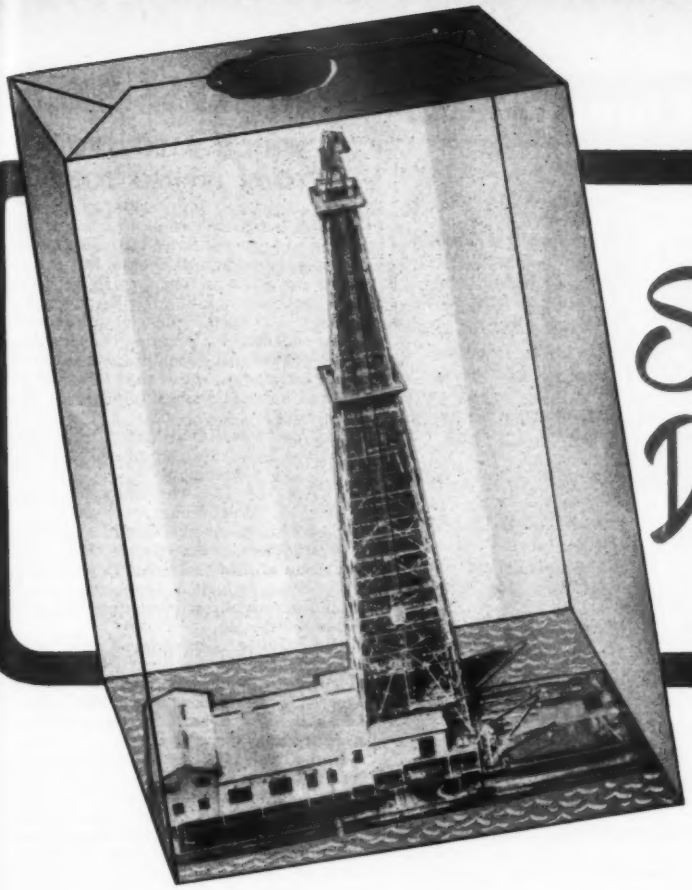

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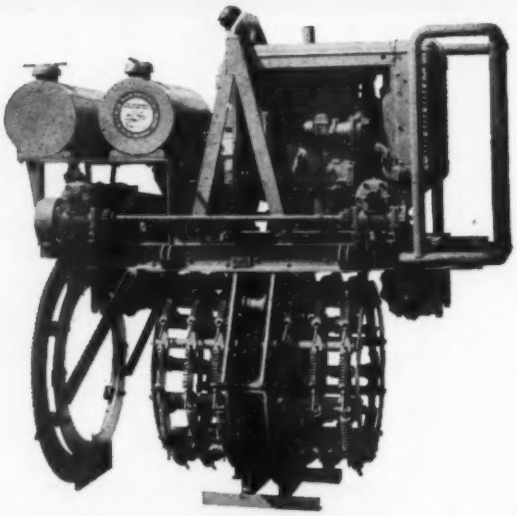

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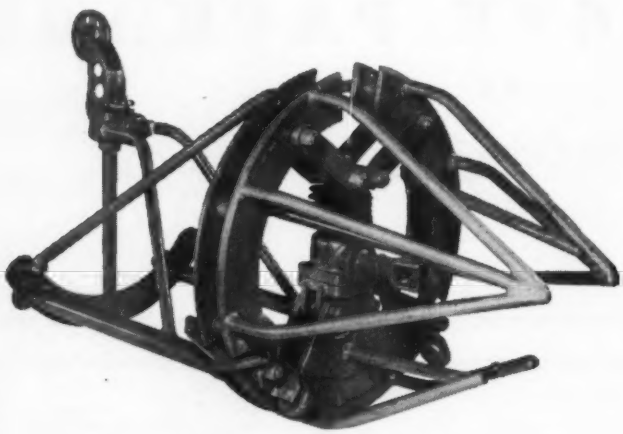

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Each exhibits inherent qualities that make it ideal for certain applications. Thus, while the group as a whole covers 95% of industry's needs, individual applications should be studied carefully to determine which grade is best for the job.

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NATURAL GAS

Ford "Dump" Gas Issue

WASHINGTON. — "Dump" gas for Ford Motor Co.'s Dearborn plant is involved in a hearing by the Federal Power Commission set for September 6. Panhandle Eastern Pipe Line Co. will be asked to submit evidence it can deliver the dump gas and also assure an adequate supply to the utilities now taking gas from its system for resale.

Panhandle has proposed to deliver 55 million cubic feet of gas daily to Ford, declaring it had that supply in excess of its present commitments. Customers of Panhandle have alleged the proposed sale to Ford would deprive them of rights to gas to which they are entitled under existing rate schedules.

When Panhandle moved for an earlier hearing to expedite settlement of the matter, FPC denied the motion in order that the earlier date might not prejudice the rights of interested parties.

This action does not determine customers' rights, but merely provides for their protection pending hearing and determination, rather than authorizing the gas to be sold to Ford at this time.

Evidence was filed that Panhandle had recently advised eight utility customers that they were taking gas for firm service in excess of commitments for this service. Firm service means gas for domestic, commercial, and small industrial users.

Further complaint is made that Panhandle demanded, in two instances, that utility companies cease deliveries of gas to certain industrial consumers.

In denying the early hearing without prejudice, the Commission affords Panhandle an opportunity to renew its request upon a showing that it has gas in excess of present commitments, and that the delivery to Ford will not diminish service to utility customers.

Increase in Home Heating

NEW YORK.—In 3 years gas utilities expect to add more than 3,000,000 new home customers to the 7,217,000 now heating their residences with gas. This estimate is made by H. Carl Wolf, managing director of American Gas Association. In Canada the goal for the same period is 13,000 new home customers.

A recent survey indicates that gas utilities will serve 1,150,000 more home customers during the coming 1950-51 heating season. This means that 40 per cent of all homes supplied with utility gas service will employ it as heating fuel.

Following the climatic pattern, most of the new heating installations in the North will be central-heating units. Space heaters and wall or floor furnaces account for the majority of heating installations planned for the South and Southwest.

What effect the impact of the Korean situation may have on the prospective growth can only be a matter of conjecture, Wolf said.

Coal Men Lose Protest

WASHINGTON.—Coal interests have lost their efforts to bar additional deliveries of natural gas to consumers in southwestern Pennsylvania.

Federal Power Commission has denied the petitions of National Coal Association, United Mine Workers of America, Fuels Research Council, Inc., and Railway Executives Association, asking leave to intervene in the application by Texas Eastern Transmission Corp. to deliver additional volumes of natural gas.

Hearing on the application has been set for September 1. The commission held that the intervening petitions were not filed within the prescribed rules. Providing no further contest is raised, the commission may dispose of the application forthwith.

Added Supply to Industry

WASHINGTON.—Increased supply of natural gas for Pennsylvania-Ohio industrial districts is provided in the Federal Power Commission's temporary authorization for Texas Gas Transmission Corp., Owensboro, Ky., to install and operate 9,960 hp. in compressor capacity at existing and new stations on its pipe-line system. The added volume will be transported for Texas Eastern Transmission Corp., Shreveport, La.

About half the additional power will be installed at four existing stations in Kentucky and Tennessee. The remainder will go into a new Kentucky station.

Texas Gas will transport the gas for Texas Eastern from an existing connection between facilities of the two companies near Lisbon, La., to another connection near Lebanon, Ohio.

The added flow will be offered to customers in proportion to their daily contract quantities under existing service agreements. East Ohio Gas Co. will receive 33,500,000 cu. ft.; Manufacturers Light & Heat Co. and Ohio Fuel Gas Co. jointly accept 25,600,000 cu. ft.; Missouri Utilities Co., 300,000 cu. ft.; and National Gas & Oil Corp., 600,000 cu. ft.

Political Gas Districts

Gas districts created as political subdivisions by the Mississippi legislature are seeking facilities to supply their lines with natural gas in an application to the Federal Power Commission. To provide line taps and metering facilities, Southern Natural Gas Co., Birmingham, Ala., asks authorization to install the needed equipment.

The natural gas would be sold at delivery points adjacent to Southern Natural's system. The purchasers will construct lateral lines to transport gas to various communities for distribution.

The proposed purchasers are North Central Natural Gas District, Deer Creek Natural Gas District, Carthage Natural Gas District, and the towns of Ethel, McCool, and Weir, Miss., and Aliceville and Carrollton, Ala.

As political subdivisions, the gas districts have power to construct and install transmission lines and distribution systems, and to issue bonds to provide construction funds.

North Central Natural would distribute gas in Ackerman, Mathiston, Eupora, Walthall, Maben, Mantee, Houston, Vardaman, Derma, Calhoun City, Pittsboro, and Bruce. Deer Creek Natural would service Cary, Rolling Fork, Anguila, Hollandale, and Arcola.

Southern Natural estimates the total annual requirements at 572,405,000 cu. ft. for the first year, rising to 707,515,000 cu. ft. in the fifth year.

Shenandoah Project

Communities now using propane and bottled gas in the Shenandoah Valley are sought as consumers of natural gas in an application filed with the Federal Power Commission. The transmission facilities are projected by Shenandoah Gas Co., Lynchburg, Va., which would build 49 miles of pipe line extending from a point on Virginia Transmission Corp.'s line near Cedarville. Costs are estimated at $2,300,000.

Shenandoah proposes to serve Front Royal and Winchester, Va., and Martinsburg, W. Va. The new facilities would include 38 miles of 8⅝-in. line and 11 miles of 4½ and 3½-in. line.

To obtain an adequate gas supply, Shenandoah asks FPC to order Virginia Gas to connect its transmission facilities with the proposed outlet. Virginia Gas is a subsidiary of Atlantic Seaboard Corp., which is controlled by Columbia Gas System, Inc.

For its retail customers Shenandoah proposes to construct or acquire distribution systems. In the event purchase is not feasible, the company would sell natural gas at wholesale to companies now operating.

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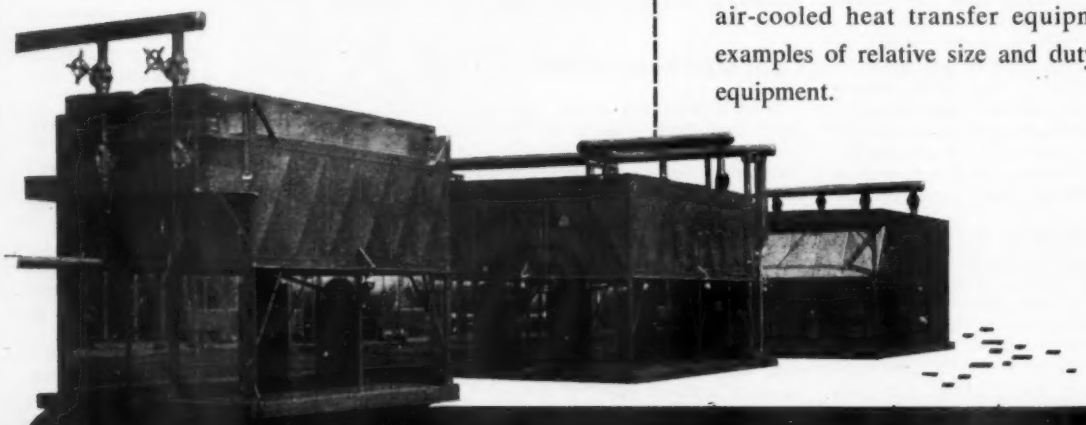

GAS COOLING	Natural Gas After-Cooler	13,920,000	80	46′ x 25′
	Manufactured Gas Cooler	11,165,000	50	23′ x 21′
	Natural Gas After-Cooler	3,400,000	15	11′ x 21′
	Natural Gas Inter-Cooler	7,890,000	40	23′ x 21′
VAPOR CONDENSING	Reflux Condenser	18,407,000	90	48′ x 25′
	Primary Condenser	4,652,000	40	11′ x 25′
	Still O.H. Condenser	4,875,000	34	16′ x 21′
	Debutanizer Condenser	11,930,000	60	23′ x 25′
	Still Reflux Condenser	39,110,000	60	46′ x 25′
	Steam Condenser	87,300,000	300	138′ x 31′
	Steam Condenser	2,880,000	10	10′ x 6′
LIQUID COOLING	Vegetable Oil Cooler	628,000	15	6′ x 17′
	Absorption Oil Cooler	14,915,000	100	32′ x 17′
	Quenching Oil Cooler	1,665,000	50	23′ x 25′
	Amine Solution Cooler	19,300,000	175	38′ x 25′
	Stabilized Crude Cooler	125,100,000	700	315′ x 25′
	Jacket Water	2,400,000	5.5	16′ x 12′
	Jacket Water	28,800,000	100	70′ x 24′

A new 8-page bulletin on Fluor-GR Fin-Fan Heat Exchangers is now being prepared. Write in and reserve your copy by post card or letter.

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REFINING

Ponca Expansion

Cities Service to build cat cracker at old plant

CITIES SERVICE OIL CO. will enlarge and modernize its refinery at Ponca City, Okla., by addition of a catalytic cracking unit of latest design, a catalytic-polymerization unit, and a gas plant.

The announcement by A. W. Ambrose, president of the company at Bartlesville, indicated that completion of the program will take from 1 to 2 years. The program also includes revision of the vacuum flashing unit, treating processes, installation of a new water-cooling tower, increased storage capacity for finished products, and additional steam, water, and other facilities.

The present crude-processing unit will be revamped to provide a capacity of 20,000 bbl. per day. It will be operated in conjunction with the vacuum flashing unit, which will use residuum as feed stock and produce gas-oil feed for the cat cracker and a product used in blending heavy fuels.

The catalytic cracking unit will be of the fluid type and will replace the present thermal cracking units. Design for the entire expansion program was prepared by M. W. Kellogg Co., New York.

Continental's Ponca City refinery is one of the oldest operating in the area, and its modernization has been under consideration for some time. At present it is rated with a crude-oil capacity of 13,000 bbl. per day and thermal cracking capacity of 4,500 bbl. per day.

Shell Refinery Picketed

ROXANA, Ill.—Shell Oil Co.'s refinery was closed last week by a strike of the pipe-fitters and asbestos-workers unions, A. F. of L., idling 3,700 employes.

Picket lines were set up by the unions which called a strike over dispute involving wages and working conditions. They are demanding pay increases of 22½ cents an hour.

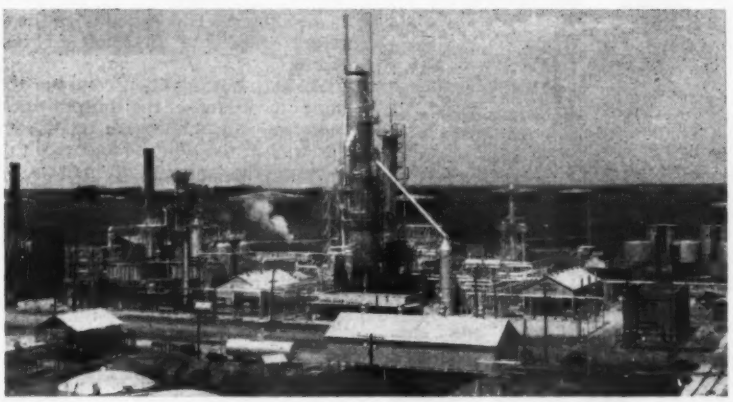
Members of A. F. of L. Operating Engineers Union, which has authorized a strike of 1,100 production employes, refused to cross the picket lines for any work but to shut down cracking units. A spokesman for the operating engineers said the union had not called a strike, but was "honoring the picket lines" set up by the two unions.

Contracts with the three unions expired May 1, with work continued under extensions of the old agreements.

Refining Dividends Drop

WASHINGTON.—Publicly reported dividend payments of oil refining corporations amounted to $20,660,000 in July compared with $38,700,000 in the corresponding month last year, it was reported last week by the Department of Commerce.

The department combined dividend payments for June and July to show that refining corporation disburse-



DEEP ROCK CONSTRUCTION.—Portion of the Cushing, Okla., refinery of Deep Rock Oil Corp. showing the newly completed catalytic cracking unit and associated facilities. At left is an old thermal cracker revised to prepare feed stock for the new unit. Open house and dedication ceremonies will be held at the refinery September 11 and 12. A detailed description of the new construction will appear in the September 7 issue of the Journal.

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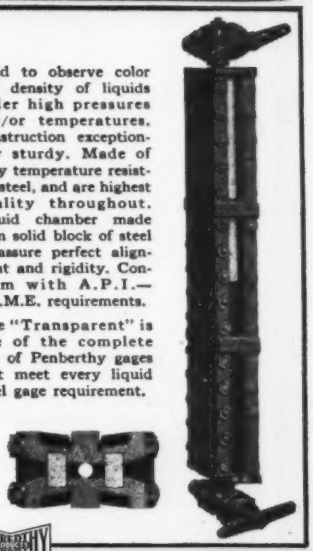

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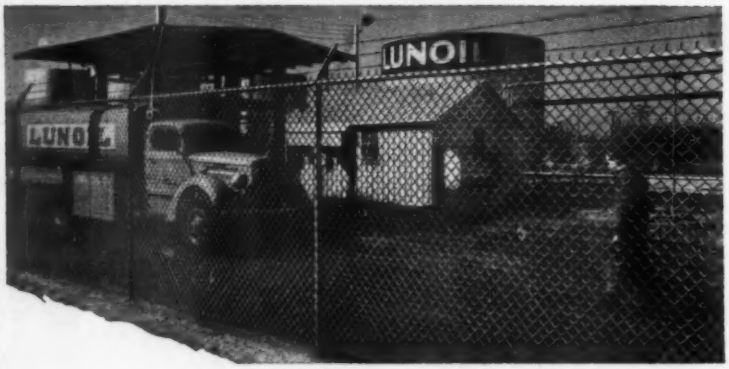

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MAKERS OF TIN BOX AND DRUM MAKING MACHINERY

dm MB 19

ments were $149,500,000 for the period compared with $162,500,000 last year. The industry's experience was contrary to that of corporations generally, whose $1,401,500,000 payments for the two months were more than $100,000,000 above the 1949 total of $1,300,900,000.

New West Coast Company

LOS ANGELES.—Westoil Terminal Co., a newly formed operating company, has purchased the physical assets of Pacific States Oil Co. The property is located in the Los Angeles Harbor area, consisting of about 100 acres of land, approximately 50,000,000 gal. of bulk storage, and the largest independent refinery installation with a daily capacity of approximately 30,000 bbl.

The new company was organized by C. Edward Miller, an independent petroleum marketer who has been active in developing Time Oil Co. Starting with a small group of service stations, the company now operates along the entire West Coast with large marine terminals in important ports.

The amount of the transaction was not disclosed, but recent appraisal indicates the value of the properties acquired will run into several millions.

Benzene Needs Studied

WASHINGTON.—The growing importance of plastics may result in the oil industry getting into benzene production in a big way to further the rearmament program.

Over the past few months growing concern has been manifested over a pending shortage of benzene for chemical manufacture, and the situation is one of several involving shortages of material which has been receiving the attention of the government agencies concerned with the war effort since the invasion of South Korea.

So far, nothing concrete has been done to increase the output of the material, but studies are reported under way in the defense agencies to determine the amount of benzene that will be required for the production of polyester resins, and the National Security Resources Board is understood to have urged its petroleum advisory committee to expedite a study of production possibilities in the oil industry.

Gasoline Taxes Gain

WASHINGTON.—Gasoline taxes brought the Treasury a handsome collection of $526,731,962.90 during the 12 months which ended last June 30, a gain of $23,084,492.66 over gasoline taxes collected by the federal Government during the previous fiscal year, the bureau reported.

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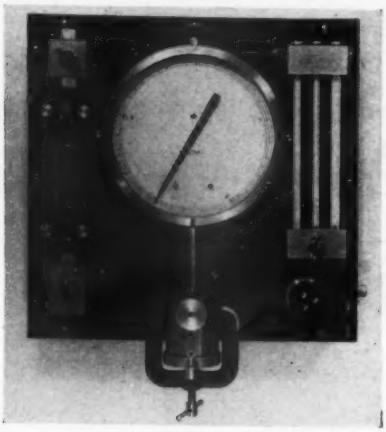
No. 10 of a series of photographs of new scientific equipment



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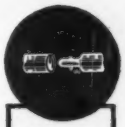

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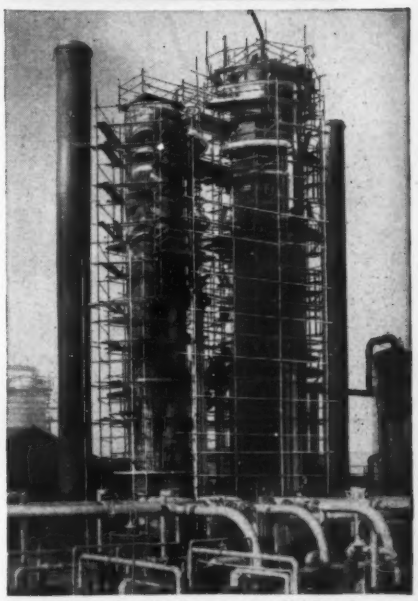

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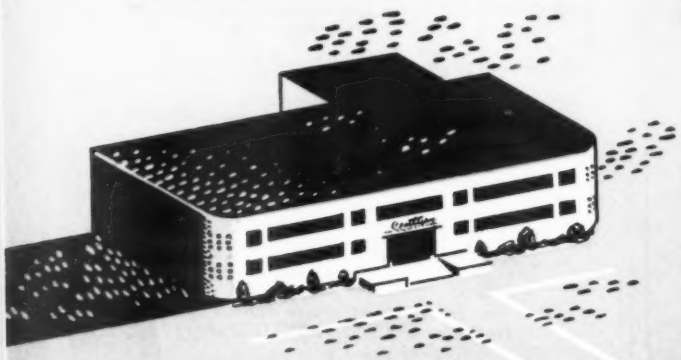

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Exploration and Drilling

Two Areas Claim Special Attention

FOUR potential discoveries in two areas roughly 600 miles apart are claiming special attention this week. The interest displayed in these discoveries stems more from what these discoveries mean to the over-all picture of the potentialities of the areas in which they are found than in the discoveries themselves, which give no indications of having opened very large pools.

The Wilcox play in southwestern Mississippi and eastern Louisiana has gotten additional stimulus by two discoveries only a few miles apart on the Louisiana side of the Mississippi River in Concordia Parish.

The Forest City basin, which has become relatively inactive after an unsuccessful drilling flurry following the discovery of Davis Ranch pool, has two discoveries, one in Wabaunsee County and the other in Nemaha County, Kansas.

East-Central Louisiana

The two Eocene Wilcox discoveries in Concordia Parish in east-central Louisiana are Carter Oil Co. 1 Graham, 48-5n-9e, and Sinclair Oil & Gas Co. 1 Campbell, 7-5n-9e.

Carter's well, at last report waiting on tanks, tested at a rate of nearly 200 bbl. of 40°-gravity oil daily through small chokes from perforations at 5,976-86 ft. The discovery well has an estimated 18 ft. of net oil sand.

Sinclair's well, preparing for production tests, was originally slated to go to the Cretaceous, but casing was run after electrical survey and sidewall samples indicated 11 ft. of net oil sand around 6,330 ft.

The Wilcox sand is believed to have great potentialities in the Mississippi Salt basin and in the belt across Louisiana between the Gulf Coast salt dome area and the Sabine uplift. The Wilcox is the most important producer on the La Salle arch, a northwest-southeast - trending structure at the west side of the Mississippi salt basin, but until comparatively recently has received little attention apart from the arch. The outstanding pools on the La Salle arch are Urania, discovered in 1925, which has an estimated ultimate recovery of 40,000,000 bbl. and has already produced over 13,000 bbl. per acre; and, Olla, discovered in 1940, which has an estimated ultimate recovery of 50,000,000 bbl.

Texas Pacific Coal & Oil Co. 1 Elliott, NW SW 35-1s-2w, in south-central Rapides Parish, recently completed as discovery of Glenmora pool through 15 ft. of perforations opposite the Wilcox near 10,700 ft., found a tremendous net thickness of Wilcox sands over a 400-ft. interval, and the potentialities of this well and its immediate area appear enormous. Texas Pacific's 1 Bentley, NE SW 35-1s-2w, and 1 Gill, SE SE 23-1s-2w, are now drilling on the Glenmora structure, which is probably over a deep-seated salt dome. This structure was originally mapped in 1918 but none of the earlier holes drilled on it went deep enough into the Wilcox to find oil. The Wilcox is roughly 3,500 ft. thick in this area.

Forest City Basin

The Forest City basin may have started a comeback with its two discoveries during this past week.

Skelly Oil Co. 2 Thoewe, 2-13s-10e, about 5 miles north and east of Davis Ranch, recovered 600 ft. of oil and no water on a 2-hour drill-stem test of a 7-ft. interval in the Viola near 2,925 ft. Skelly 1 Thoewe, also in 2-13s-10e, now temporarily abandoned, had a small show of oil in the Lansing-Kansas City, and a good show of oil with a considerable amount of water in the Viola.

The second test of interest to the Forest City basin is Carter 1 Strahm, 13-2s-14e, about 3 miles north of the company's Strahm field. This test topped the Hunton at 2,825 ft. and on one drill-stem test (2,826-29 ft.) recovered 400 ft. of 28°-gravity oil in 1½ hours. This test is on a different structure from the Strahm pool, which has one Hunton and one Voila well.

In spite of discouraging results of the large number of wildcats drilled in the Forest City basin, the area still is considered potential oil country by many competent geologists. Davis Ranch is the only significant pool in the Kansas portion of the basin to date. This pool, producing from the Viola, now has 18 producing wells and 1 edge well drilling.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MID-CONTINENT.—In Oklahoma, a rank wildcat may establish Alfalfa County's first production. Davis et al. 1 Glidewell swabbed 2 bbl. of oil per hour from a depth of 5,935 ft. Testing continues at the well, located in SW SW NE 14-24n-11w. There are prospects of renewed activity in Kansas' Forest City Basin, following promising oil shows in two wildcats: Skelly Oil Co. 2 Thoewe, 2-13s-10e, Wabaunsee County, and Carter Oil Co. 1 Strahm, 13-2s-14e, Nemaha County. (See following field report in this issue.)

ROCKY MOUNTAIN AREA.—Wildcat drilling in the Denver-Julesburg Basin area of Colorado and Nebraska has increased following additional discoveries through the area. Mountain Fuel Supply Co. is coring, possibly in the Dakota, at its deep test at Hiawatha, Colorado.

SOUTH LOUISIANA.—Tide Water Associated Oil Co. has gaged a tubing pressure of 9,500 psi. in its 1 John Watt, Manila Village field, Jefferson Parish, which is believed to be the highest tubing pressure of any well in the United States. The well is still cleaning, however, and the estimated flow is 72 bbl. of oil per day through 7/64-in. choke, from perforations at 12,852-58 ft. (See following field report in this issue.)

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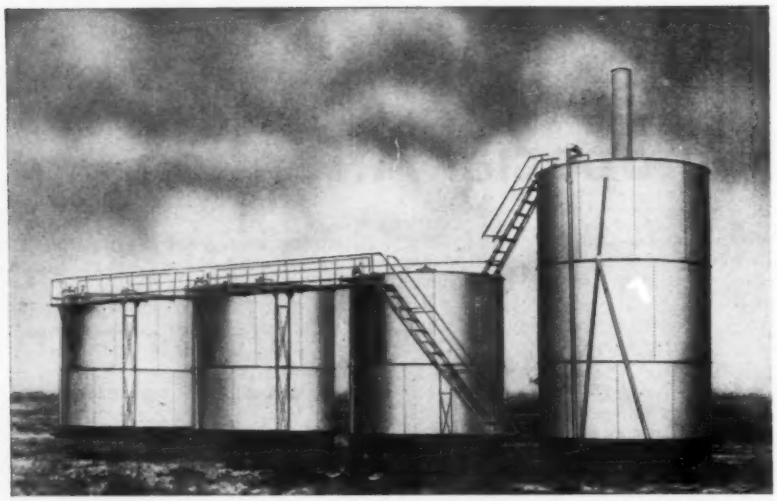

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Michigan

Squaw Bay Traverse Sand Again Is Disappointment

MOUNT PLEASANT.—It was not surprising when flowing oil production from the Squaw Bay Traverse failed to continue to flow at Neil Wagenaar & Edward Wagner 1 Marshall, SE SW SE 11-27n-6w, Excelsior Township wildcat, Kalkaska County, after acid treatment. The Squaw Bay has been a flashy but not too reliable oil-producing horizon anywhere in Michigan. However, this wildcat was still continuing to demand serious attention from Michigan oil operators.

The well originally was bottomed out for test at 2,009 ft. with a hole full of oil. Top of objective was picked at 2,001 ft. (corrected up the hole from 2,004 ft. by steel line). After flowing 25 bbl. in 1 hour and 72 bbl. in 4 hours after acid treatment with 750 gal. at 2,009 ft., tubing was pulled and hole deepened to 2,042 ft. It was believed that more Traverse oil saturation might have been logged at 2,033-35 ft., the point which a correlating dry-hole test to the southeast carried a show of gas and water. This oil pay, if actually present, is probably in the Alpena Traverse section. On swab test after deepening, well produced 6 bbl. of oil and no water when swab was run to bottom five times. Fluid level appeared to remain at the same level before and after swabbing, lending proof to the theory that further oil pay had been logged at 2,033-35 ft. Before deepening swabbing lowered fluid level.

At least three tests, either offset or close in to I. W. Hartman 1 Manley, Orient Township Dundee oil discovery, Osceola County, appeared ready for early drilling this week. Hartman had staked the 2 Manley, NW NE SE 33-17n-7w, diagonal northwest 20-acre offset to the discovery; Roosevelt Oil & Refining Corp., on the east offset, was ready to drill at the NW NW SW 34-17n-7w; and Louis Rose, on a farmout from D. C. Slusser & Associates, was reported to be ready to move to the NW NW 31-16n-7w, Fork Township, Mecosta County. Sohio Petroleum Co., with the north and south offset leases to the 1 Manley, was unofficially reported to be preparing to drill.

MICHIGAN SUCCESSFUL WILDCATS

Newaygo County, Garfield Township: Fish, McMillan, Chopard & Howard 1 Frens, SE NE SW 30-12n-13w, Traverse 2,219 ft., 15 bbl., TD 2,221 ft.

Oceana County, Otto Township: P. K. Degenther 1 State-Otto, SE SE SE 32-13n-16w, Berea 1,445 ft., 4 bbl. after rework, TD 1,895 ft. (dry in Traverse) PB to 1,464 ft.

Osceola County, Orient Township: Irvin W. Hartman 1 Manley, SE NE SE 33-17n-7w, Dundee 3,788 ft., 120 bbl. restricted, TD 3,792 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Manlius Township: Ford Oil Co. 1 Wilke-Crock et al, SE NE NW 17-3n-15w, Traverse 1,313 ft., dry, TD 1,353 ft.

Clare County, Garfield Township: Sam Hindman 1 State-Garfield, E½ NW NE 33-17n-6w, Dundee 3,955 ft., dry, TD 3,974 ft.

Kalkaska County, Springfield Township: Taggart Bros. Gas Co. S-2 Consumers Power Co., NW 35-25n-8w, Traverse 2,356 ft., dry, TD 2,360 ft.

Mecosta County, Aetna Township: W. H. Strickler 1 Lutterbeck & Braunner, C NE 15-13n-10w, Stray 1,232 ft., dry, TD 1,259 ft.

Mecosta County, Green Township: Mercer Oil Co., Inc. 1 Kilpatrick - Montague, NW NW SW 23-16n-10w, Traverse 2,900 ft., dry, TD 2,943 ft.

Oceana County, Hart Township: Mercer Oil Co., Inc. 1 Newton-Lyons, SW NE 20-15n-17w, Monroe 2,450 ft., dry, TD 2,480 ft.

Kansas

New Pools Indicated by Forest City Basin Tests

THE Forest City Basin in the northeastern part of the state is back in the spotlight following the finding of promising oil showings in two additional wildcat tests, one in Wabaunsee County and the other in Nemaha County.

Skelly Oil Co. 2 Thoewe, SW SE NE 2-13-10e, Wabaunsee County, is a prospective discovery well in Viola lime. A drill-stem test in the top of this pay gave a recovery of 600 ft. of clean oil with no indication of water. Indicated bottom-hole pressure during the test, with tool open 2 hours, was 1,000 psi. The pay was topped at 2,923 ft. (—1,816 ft.). The test took in an interval at 2,919-26 ft. Casing has been run for completion.

This is Skelly's second test in the area. The first, 1 Thoewe, located about ¼ mile to the southwest, had showings in the same zone but got considerable water. It recently was abandoned. The area is about 5 miles northeast of the Davis Ranch pool, whose discovery early last year precipitated a widespread wildcatting play throughout the Forest City Basin. That pool produces from the top of the Viola lime.

The Nemaha County wildcat is Carter Oil Co. 1 O. Strahm, NW SW NW 13-2-14e. Its showings are in the Hunton lime, topped at 2,825 ft. (—1,573 ft.). A 90-minute drill-stem test taking in an interval at 2,826-29 ft. yielded 400 ft. of 28° oil in the breakdown. Bottom-hole pressure during the test was 900 psi. Hole then was deepened to 2,834 ft. where a second test was made, taking in the interval below 2,829 ft. Tool was open 2 hours. Recovery in this case was 100 ft. of oil plus 10 ft. of drilling mud. Bottom-hole pressure was 1,000 psi. Hole is being cored ahead.

This well is about 5 miles northeast of Carter's Strahm pool. This pool, opened in 1948, has two wells, one, the discovery well, producing from the Hunton lime, and the other, completed this year, producing from Viola lime.

In Rooks County, on the Central Kansas Uplift, Heathman Drilling Co. has completed its 1 Raymond, NW NW NW 30-10-20, with a potential of 127 bbl. per day on the pump. It opens the Laura pool. Production is from Arbuckle lime, topped at 3,705 ft. (—1,583 ft.). Total depth is 3,708 ft. with hole open from 3,706 ft. The discovery, in the southwestern part of the county, is about 2 miles southeast of the Morlan pool.

Another wildcat oil-well completion in the same county is Anschutz Drilling Co. 1 Grover, CEL NE NE 22-7-19, 2 miles northeast of Webster, in the northwestern part of the county. It got a potential rating of 143 bbl. of oil per day. Pay is in the Lansing-Kansas City section with casing perforated at 3,296-3,303 ft. and 3,272-80 ft. Top of the Lansing is 3,126 ft. with a surface elevation of 1,935 ft. Hole had been plugged back to the Lansing-Kansas City pay after getting water in the Arbuckle, topped at 3,396 ft.

Production of the Nettie pool, in the same county, is being extended about ½ mile to the northwest at Berwick and associates 1 Westhusin, SE SE SE 33-9-17. Testing Arbuckle lime, topped at 3,552 ft. (—1,443 ft.), the well swabbed and flowed an average of more than 33 bbl. of oil per hour. This is the second Arbuckle producer for the pool.

Opening a new pool located 2 miles northwest of nearest production in the Silica pool and 2 miles southeast of the Kowalski pool in eastern Barton County, Alpine Oil & Royalty Co. 1 Hartman, SE SE NE 28-19-11, swabbed an average of 4 bbl. of oil per hour during a 12-hour test. Production is from Arbuckle lime, topped at

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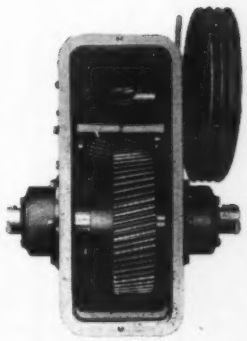

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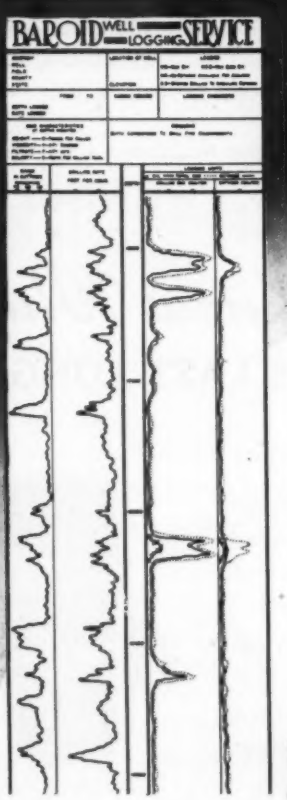

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3,340 ft. (—1,559 ft.), and bottomed at 3,350 ft.

Sohio Petroleum Co. and Derby Oil Co. have opened a new reservoir, the Lansing-Kansas City series, for the Mary Ida pool, Rice County. Their 1 Reif, NW NE SW 31-18s-10w, plugged back from the Arbuckle, in which it was completed last February as the discovery, and so far only producer for the pool, established a state potential of 481 bbl. per day from the Lansing. Earlier, it flowed 348 bbl. of oil in 23 hours through ¼-in. choke after a 500-gal. acid treatment. Casing is perforated at 3,024-26, 3,033-35 ft., and 3,038-48 ft. Previous Arbuckle production was at 3,273-79 ft.

Testing of Arbuckle lime showings is under way at The Texas Co. 1 Fries, SE SE NW 10-12-20, a rank wildcat located 5 miles northeast of the Ellis pool, nearest production, in northwestern Ellis County. With 11 ft. of pay open, the well swabbed 6½ bbl. of net oil and 1½ bbl. of water in 10 hours following a 2,000-gal acid application. With an additional 3,500 gal. of acid, the well bailed 32 bbl. of oil and 1½ bbl. of water in 16 hours. Bottom of the hole is 3,919 ft. The pay was topped at 3,906 ft. (—1,704 ft.). Casing is at 3,908 ft.

KANSAS SUCCESSFUL WILDCATS

Butler County: McClure et al 1 Hartenbower, C N/2 NE NW 16-29s-6e, elev. 1,388 ft., pumped est. 140 bbl. of oil per day from Peru sand topped at 2,450 ft., TD 3,298 ft., Lansing 1,745 ft., Kansas City 2,121 ft., Mississippian 2,792 ft., Arbuckle 3,218 ft.

Graham County: Cook & Galloway and Hansen 1 De Young, SW SW SW 35-9s-21w, elev. 2,276 ft., 3,000 bbl. of oil per day from Arbuckle topped at 3,826 ft., TD 3,829 ft., anhydrite 1,752 ft., Topeka 3,265 ft., Heebner 3,469 ft., Toronto 3,491 ft., Lansing 3,512 ft., conglomerate 3,786 ft., Simpson 3,814 ft., Arbuckle 3,826 ft.

Greenwood County: Darling et al 1 Johnson, CNL SE SE 32-26s-11e, pumped 50 bbl. of oil per day from Mississippian topped at 1,862 ft., TD 1,876 ft.

KANSAS WILDCAT FAILURES

Barber County: Continental 1 Thompson, SW NW SW 5-32s-10w, elev. 1,575 ft., dry, TD 5,000 ft., Lansing 3,752 ft., Mississippian 4,438 ft., Kinderhook 4,635 ft., Viola 4,726 ft., Simpson 4,795 ft., Arbuckle 4,930 ft., strat test.

Barton County: C. E. Ash 1 Moses est. "C," NW SW SW 35-17s-13w, elev. 2,820 ft., dry, TD 3,363 ft., anhydrite 705 ft., lime 3,083 ft., Lansing 3,097 ft., Arbuckle 3,328 ft.

Lauck 1 Tichner, NE NE SW 14-16s-11w, elev. 1,844 ft., dry, TD 3,364 ft., Lansing 3,014 ft., conglomerate 3,310 ft., Arbuckle 3,339 ft.

Henderson 1 Rzika, NW NW NE 33-17s-12w, elev. 1,857 ft., dry, TD 3,470 ft., anhydrite 754 ft., Topeka 2,710 ft., Heebner 3,040 ft., lime 3,139 ft., Lansing 3,154 ft., conglomerate 3,418 ft., Arbuckle 3,442 ft.

Butler County: Holcomb-Copeland 1 Berg, NW NE NW 24-29s-4e, elev. 1,282 ft., dry, TD 3,335 ft., Kansas City 2,274 ft., Mississippian 2,909 ft., Arbuckle 3,300 ft.

Cowley County: Murfin 1 Judd, NE NE NE 35-34s-6e, elev. 1,356 ft., dry, TD 3,436 ft., Mississippian 3,060 ft., Arbuckle 3,392 ft.

Harvey County: Ingling et al 1 Krehbiel, SE SE NW 14-23s-2e, elev. 1,455 ft., dry, TD 3,380 ft., Lansing 2,177 ft., Mississippian 2,857 ft., Hunton 3,160 ft., Viola 3,247 ft., Simpson 2,292 ft., Arbuckle 3,349 ft.

Phillips County: Honaker 1 Fogelman, NW NW SE 4-2s-18w, elev. 2,229 ft., dry, TD 3,555 ft., anhydrite 1,825 ft., Heebner 3,406 ft., Lansing 3,432 ft.

Superior 77-22 Steele, NW SE SE 22-5s-17w, elev. 1,806 ft., dry, TD and other data not realesed.

Pratt County: A. D. Allison 1 Flemming, SE SE NE 33-28s-13w, elev. 1,947 ft., dry, TD 4,657 ft., Lansing 3,931 ft., Mississippian 4,370 ft., Kinderhook 4,400 ft., Viola 4,413 ft., Simpson shale 4,493 ft., Simpson sand 4,499 ft., Arbuckle 4,592 ft.

Sedgwick County: Mallard 1 Abercrombie, SW SW SE 17-27s-4w, elev. 1,366 ft., dry, TD 3,712 ft., Lansing 2,820 ft., Mississippian 3,622 ft.

Sheridan County: Musgrove-Mallard 1 Younger, SE SE SE 24-10s-27w, elev. 2,576 ft., dry, dry 4,395 ft., Heebner 3,667 ft., Lansing 3,696 ft., Mississippian 4,380 ft.

Stafford County: Ben Brack 1 Teichman, SE SE SW 8-25s-11w, elev. 1,818 ft., dry, TD 4,155 ft., Lansing 3,507 ft., Misener 3,974 ft., Viola 3,980 ft., dolomite 3,986 ft,, Simpson 4,073 ft., Arbuckle 4,134 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County: Pressman & Payne 1 Schulenberg, SW SW NW 14-2n-16e, dry, TD 2,590 ft., no tops reported.

Texas Gulf Coast

Tight Well May Be New Matagorda Bay Discovery

HOUSTON.—A new oil discovery is indicated at Brazos Oil & Gas Co. 1 State of Texas "O" (Lse. M-30064), wildcat test 4 miles south of Palacios in Matagorda Bay. The well is being drilled tight, however, unconfirmed reports indicate that oil was recovered on drill-stem test from approximately 5,177-82 ft. On a previous drill-stem test through perforations at 5,137-40 ft. the well tested mud and salt water. Hole is bottomed at 5,907 ft.

Oil production in New Ulm field, Austin County, has been extended to the west by completion of Oil Drilling, Inc., 1 Selma Holzman, which is perhaps the biggest and best oiler in the field. On a 24-hour potential test, the well flowed at the rate of 206 bbl. of 40°-gravity oil per day

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through a 10/64-in. choke. Production is through perforations in the casing at 9,438-47 ft. Potential has not been taken on the tubing sand, which is perforated at 9,638-55 ft. The well is located in the A. Kuykendall Survey. It was originally drilled by J. A. Gray, but Oil Drilling, Inc., has taken over operations of Gray at New Ulm.

Sohio Petroleum Co. B-1 Nona Mills, wildcat test 5 miles southwest of Kountz townsite, Hardin County, has been completed for 102 bbl. of 32.6°-gravity oil per day through ⅛-in. choke. Production is through perforations at 7,646-52 ft. Total depth is 9,212 ft. The new discovery is located in the WC RR Survey 355, A-519.

The Sunray Oil Corp. has a possible gas-distillate discovery at its 1 J. C. Dillworth, wildcat test in the Refugio County School Land Survey, Abstract 398, Live Oak County. On 18-minute drill-stem test in the Luling sand from 7,109-17 ft., using 500 ft. of water cushion, ¼-in. choke, recovery was 10 ft. of condensate-cut mud, 10 ft. of condensate, 265 ft. of water cushion with trace of condensate, and 180 ft. of gas-cut mud. Bottom-hole flowing pressure was 3,725 psi. Operators are now coring ahead in the venture.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Brazoria County: Gas-distillate discovery—Skelly Oil Co. 1 E. O. Koutnik, W. D. C. Hall Sur., A-69, 5 mi. S of Sandy Point field, top pay 7,528 ft., TD 9,340 ft., perf. 7,528-28½ ft., IP: 23 bbl. condensate per day, plus 738,000 cu. ft. of gas (estimated), ¼-in. choke, TP 2,550 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: M. T. Grubb & R. N. Ranger 1 Paulus Estate, Thos. Boatwright Sur., 6 mi. SE of Belleville, dry, TD 5,857 ft.

Burleson County: Livingston Drilling & Well Service 1 J. E. Dyer, J. C. Walker Sur., 7 mi. NE of Tanglewood, dry, TD 6,502 ft.

Jefferson County: Kirby Petroleum Co. 1 John Pipkin et al, A. Houston League, A-33, dry, TD 7,315 ft.

Polk County: Livingston Drilling & Well Service Co., Inc., 1 S. H. Edmonds, Goodrich area, Isaac Parker Sur., A-61, 2 mi. NE of Goodrich, dry, TD 3,963 ft.

Walker County: L. M. York 1 Louise Slott et al, J. M. De La Garza Grant, Jackson Crouch Sur., 1 mi. SE of New Waverly, dry, TD 4,032 ft.

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Louisiana-Arkansas

LaSalle Parish Discovery Waits Official Completion

SHREVEPORT.—Hunt Oil Co. 25 Louisiana Delta, 25-5n-4e, La Salle Parish new discovery, is waiting on official test for completion. Total depth is 6,005 ft. in the Wilcox. The new field is to be North Saline Lake field. It is 1 mile north of Saline Lake field.

Continental Oil Co. 1 Wideman, 21-21n-7w, Claiborne Paris, on a 1-hour drill-stem test from 7,596-7,624 ft., using ½-in. choke, recovered 50 ft. of salty gas-cut mud. Core from 7,625-60 ft. showed fairly porous lime with a very slight show of oil.

The California Co. 1 Vaughn "Unit 34," 13-19n-4w, Cotton Valley test in Hico-Knowles field, Lincoln Parish, is dry at 9,031 ft. in the Cotton Valley. Plug was set at 8,700 ft. The well may be completed later in the Bodcaw topped at 8,622 ft.

Duerr & Bolin Co. 1 H. P. Jones, 24-15n-6e, 5 miles southeast of Richland gas field in Richland Parish, is dry at 3,607 ft. in the Travis Peak topped at 3,603 ft. Thitry-eight sidewall cores were taken from 2,004-3,571 ft. but there were no shows.

Southwest Gas Production Co. et al 1 C. C. Colvin, 8-21n-2w, 3 miles east of Bernice in Union Parish, is drilling below 6,284 ft. in shale. Top of the Sligo is 4,550 ft. and the Travis Peak at 4,794 ft.

J. D. Collins et al 1 Caplis, 33-16n-12w, 2 miles west of Elm Grove field, Caddo Parish, will perforate and test the Kilpatrick from 4,424-34 ft. Total depth is 4,576 ft. in Rodessa.

Stanolind Oil & Gas Co. 1 G. W. Meadors, 8-22n-5n, 3 miles southeast of Colquitt, was coring at 10,696 ft. in the Smackover.

In Arkansas, C. H. Murphy 1 Emon, 20-18s-18w, Columbia County wildcat test 3 miles south of the Spottsville, cored from 8,359-84 ft. There were no shows. It is dry at 8,834 ft. in the Smackover.

C. H. Murphy 1 Concannon, 29-19s-18w, northwest offset to Tubal field discovery of Columbia County, was drilling below 9,262 ft. in the Buckner topped at 9,100 ft.

Austin Petroleum Corp. 1 Ellis, 15-16s-23w, midway between the Buckner and Lewisville fields in Lafayette County, is dry at 4,673 ft. Top of the James is 4,317 ft. and of Travis Peak at 4,646 ft.

Two miles north of Patton field, Lafayette County, Lion Oil Co. 1 Olivia, 17-17s-24w, took a 10-minute drill-stem test from 7,890-7,923 ft. in the Cotton Valley. No pressure was recorded. Recovery was 900 ft. of salty gas-cut mud.

ARKANSAS WILDCAT FAILURE

Union County: C. H. Murphy 1 Decimus, 33-18s-15w, TD 7,769 ft., flowed 59 bbl. oil a day, Smackover perforations 7,705-10 ft.

ARKANSAS WILDCAT FAILURE

Miller County: Lee & Markham Prod. Co. 1 Frost Trust Est., dry, TD 4,999 ft., elev. 223 ft., Kilpatrick 4,674 ft., Hill 4,771 ft., Gloyd 4,923 ft.

Permian Basin

Lynn County Wildcat Will Complete in Strawn

MIDLAND.—Completion attempt is to be made in the Strawn lime at the Houston Oil Co. and Seaboard Oil Co. 1 H. B. Howell, Section 451, Block 1, EL Survey, Lynn County wildcat 6 miles northwest of the O'Donnell Pennsylvanian pool and 7½ miles southeast of Tahoka. On two drill-stem tests of the Strawn, topped at 7,320 ft., minus datum point of 6,287 ft., the first recovered water blanket and 720 ft. of 39°-gravity oil and the second 500 ft. of heavily oil and gas-cut mud and 226 ft. of drilling mud.

Shell Oil Co. 1 Edwards, Section 4, Block B-20, Public School Lands Survey, eastern Ward County wildcat, on a 2-hour drill-stem test from 5,021-5,125 ft. had gas to the surface in 68 minutes. Recovery was 450 ft. of heavily gas-cut mud, containing 22 per cent oil. Flowing pressure ranged from zero to 100 psi. Bottom-hole pressure was 350 psi. in 20 minutes.

Flowing production in excess of 100 bbl. hourly continued to develop on successive drill-stem tests of the Pennsylvanian lime at the Union Oil Co. 1 Laura A. Cotten, Section 91, Block 5, D&W Survey, Terry County discovery 4 miles southeast of Brownfield and 7 miles north and slightly west of Corrigan Fusselman field. On the fifth test, run from 10,062-123 ft., open 75 minutes, gas was at the surface in 4 minutes, mud in 11, and oil in 11½ minutes. Cleaned into pits for 3 minutes, flow was turned into tanks for 1 hour, flowing 110 bbl. of oil. Operator was coring past 10,153 ft. in lime with no show. Last core from 10,123-153 ft. recovered gray lime with shale streaks.

C. W. Murchison 1 Joe Cannon, Section 13, Block 41, T-4-S, T&P Survey, wildcat north of Pegasus field, Midland County, topped the Spraberry at 7,735 ft. Operator drilled to 7,977 ft. and tested mud with no show. Drilling was resumed. Elevation is 2,889 ft.

Stanolind Oil & Gas Co. will drill a 9,400-ft. Ellenburger exploration in the east-central part of Howard County, 1,980 ft. from the north line and 660 ft. from the east line of Section 25, Block 31, T1-N, T&P Survey, 3 miles north of Coahoma. Well will be 1 P. L. Buchanan. The site is about 4 miles southwest of Shell Oil Co. 1 O'Daniel, recent Pennsylvanian reef discovery which failed in the Ellenburger. It is also about 2 miles northeast of an Ellenburger failure drilled by Southern Minerals and Forest Oil Co. northwest of Iatan-East Howard field.

About 1 mile southwest of the Reinecke field, Borden County, Fair, Parker & McCune 1 T. L. Griffin, Section 46, Block 25, H&TC Survey, on a 2-hour drill-stem test from 6,540-90 ft. recovered 330 ft. of mud cut heavily with oil and gas. Bottom-hole pressure was 250 psi. and shut-in pressure 900 psi. after 15 minutes. Operators were drilling ahead.

Sunray Oil Corp. and Seaboard will drill a Pennsylvanian test nearly 4 miles northeast of Cogdell field in Kent County. The test is 1 W. A. Mays, 1,980 ft. from the south line and 1,900 ft. from the west line of Section 57, Block 4, H&GN Survey. The site is 2 miles southeast of a Pennsylvanian failure drilled by Sohio Petroleum Co.

Final completion is in prospect for the second well in Ropes reef field. Honoluiu Oil Co. and Signal Oil Co. 1 J. C. Hopper, Section 8, Block 5, Wilbarger CSL Survey, north offset to the discovery, flowed 42.5 bbl. of clean oil in 3 hours in a drill-stem test from 9,400-13 ft.

Wilshire Oil Co., Inc., and Balboa Oil Co. 1-A Brooks, Section 21, Block 3, H&TC Survey, east-central Irion County wildcat, 13 miles north of the Tankersley pool, is testing the Ellenburger from 7,300-30 ft. A 30-minute test of the zone from 7,259-7,305

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ft. recovered 190 ft. of drilling mud. Deepened from 7,305-30 ft., the section from 7,314-20 ft. was soft, porous dolomite with shows of oil and gas.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

Howard County: Shell Oil Co. 1 M. H. O'Daniel, Sec. 2, Blk. 30, T-1N, T&P Sur., 5 mi. N Iatan-East Howard field, TD 8,780 ft., PB 8,010 ft., elev. 2,268 ft., top Reef 7,977 ft., pay 7,995 ft., flowed 404 bbl. 46°-gravity oil a day through ⅜-in. choke on 2-in., GOR 1,841 cu. ft., TP 500 psi., CP 1,100 psi., Spraberry 4,978 ft., Mississippian 8,418 ft., Ellenburger 8,703 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Coke County: Deep Rock Oil Corp. 1 L. E. Cowley, Sbdn. 3, Caldwell CSL Sur. A-46, 4½ mi. SE Robert Lee, dry, TD 6,405 ft., elev. 1,860 ft., Palo Pinto 4,952 ft., Strawn 5,280 ft., Ellenburger 6,302 ft.

Crockett County: J. A. Snowden et al 1 Hugh Andrews, Tr., Sec. 43, Blk. UV, GC&SF Sur., 3 mi. NE Todd Deep field, 5 mi. SW Midway Lane field, dry, TD 7,750 ft., elev. 2,658 ft., Spraberry 4,255 ft., Dean 5,355 ft., Wolfcamp 5,478 ft., Ellenburger 7,375 ft.

Gaines County: Stanolind Oil & Gas Co. and Amerada Petroleum Corp. 1-C J. O. Jones, Sec. 14, Blk B, D&W Sur., 1¼ mi. NW Cedar Lake field, dry, TD 4,839 ft., elev. 3,145 ft., San Angelo 4,460 ft.

Garza County: H. E. Chiles, Jr. 1 Spinning, Sec. 6, Blk. 5, GH&H Sur., 4 mi. NW Justiceburg, dry, TD 3,150 ft., elev. 2,446 ft.

Kent County: Sun Oil Co. 1 Bilby Wallace, Sec. 46, Blk. 98, H&TC Sur., 4¼ mi. SE Clairemont, dry, TD 7,456 ft., elev. 2,188 ft., Ellenburger 7,332 ft.

Pecos County: Childress Royalty Co. 1-F J. S. Masterson, Sec. 24, Blk. 140, T&STL Sur., dry, TD 1,766 ft., elev. 2,535 ft., Grayburg 1,550 ft.

Runnels County: Casiano Co. 1 F. J. Pieper, J. P. Freeman Sur. 1, 4 mi. SW Ballinger, dry, TD 4,212 ft., elev. 1,692 ft., Home Creek 2,930 ft., Palo Pinto 3,404 ft., lower Capps 3,945 ft.

J. Collier Hurley 1 W. S. Evans, Josiah F. Wrenn Sur. 277, A-525, 6 mi. NE Bronte, 2½ mi. SE production in Ft. Chadbourne field, dry, TD 5,622 ft., elev. 1,862 ft., Swastika 3,358 ft., Home Creek 3,924 ft., Palo Pinto 4,220 ft., Caddo 5,143 ft., Ellenburger 5,305 ft.

T. W. Murray & Bob Gilchrist 1 Fred Prusser, Sec. 337, H&TC Sur., 6 mi. SE Winters, dry, TD 4,648 ft., elev. 1,745 ft., Palo Pinto 3,555 ft., upper Caps 3,660 ft., Fry 3,790 ft., Ellenburger 4,478 ft.

Tom Green County: Duncan Sartain 1 George S. Broome, Sec. 302½ SF Sur. 133386, 8½ mi. NW San Angelo, dry, TD 865 ft., elev. 1,952 ft.

Duncan Sartain 1 Jack Matthews, C. Schmidt Sur. A-215, 13 mi. SE Water Valley field, 3 mi. S Carlsbad, dry, TD 645 ft., elev. 2,004 ft., San Andres 630 ft.

Duncan Sartain 1 W. H. Shaw, Sur. 30, Mason & Perry Subn., 3 mi. SE Carlsbad, dry, TD 715 ft., elev. 1,953 ft.

Ward County: Geochemical Surveys, Inc. 1 W. H. Echols, Sec. 45, Blk. 33, H&TC Sur., 3¾ mi. due S Monroe field, 2½ m. W Barstow, dry, TD 4,825 ft., elev. 2,573 ft., Delaware 4,760 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Amerada Petroleum Corp. 1-S-A State, 35-14s-33e, 1½ miles northeast of Gulf Oil Corp. 1 Maud Saunders, Pennsylvanian discovery in the northeast part of Lea County, has indicated possible production from the Wolfcamp topped at 9,235 ft. This is 45 ft. low to Gulf 1 Saunders. Cored from 9,860-9,908 ft. it recovered 47 ft. of lime. Samples showed porosity and oil staining from 9,927-39 ft. and 9,953-58 ft. On an 8-hour drill-stem test from 9,919-58 ft. the testing tool was plugged after 4 hours. Operator started to pull tool and gas surfaced. Packer was reset for 4 hours. When drill pipe was pulled, recovery was 2,590 ft. of 37.6°-gravity oil and 4,968 ft. of sulfur water. Operator was preparing to retest with hole bottomed at 9,958 ft.

Gulf 1 Sams-State, 17-15s-33e, northwestern Lea wildcat, was drilling below 12,987 ft. in lime and chert. Drill-stem test from 10,496-10,530 ft. recovered water blanket and 1,260 ft. of salty sulfur water.

Magnolia Petroleum Co. 1 Mathews-Federal, 13-9s-35e, on the southeast side of the Bough pool of northeastern Lea, has been completed for 333 bbl. of 48.9°-gravity oil daily from the Pennsylvanian lime between 9,597-9,626 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Chaves County: J. W. Brown 2 State, 26-10s-26e, dry, TD 800 ft., elev. 3,736 ft., top salt 445 ft.

Eddy County: R. W. Fair 1 Bujac, 22-19s-26e, 4 mi. NW McMillan pool, dry, TD 1,919 ft., elev. 3,286 ft., San Andres 1,348 ft.

North Central Texas

Quanah Wildcat Cores Granite Wash Oil Show

WICHITA FALLS.—Cities Service Oil Co. 1 Certainteed Products Co., Section 145, Block H, W&NW Survey, Hardeman County wildcat 2 miles north of Quanah, had a good show of oil in granite wash in a core from 5,840-59 ft. The core returned 7 ft. of granite wash containing the oil show and 1½ ft. of dark-gray shale and 4½ ft. of sandy granite wash with a slight show of oil. A drill-stem test was under way. A previous drill-stem test from 5,826-40 ft. recovered 60 ft. of free oil and 75 ft. of heavily oil and gas-cut drilling mud in 1 hour.

Completion as a Caddo discovery has been made at Cities Service and Sinclair Oil & Gas Co. 1-207 Swenson, Section 207, BBB&C Survey, 10 miles northwest of Throckmorton. It rated 384 bbl. a day through 24/64-in. choke from perforations at 4,738-4,913 ft. Acid was used. This well was drilled to the Mississippian. After unsuccessful tests were made of that zone, it was plugged back.

Preparations are being made to complete a Jennings-sand discovery 3 miles southeast of Novice in Coleman County. French M. Robertson and L. G. Rhodes 1 Jones, Section 16, Block 2, T&NO Survey. Operators took a drill-stem test from 2,443-53 ft. Gas appeared at the surface in 5 minutes and oil in 1 hour and 55 minutes. The well flowed at an estimated rate of 20 bbl. an hour. Pipe was run to the top of the sand at 3,443 ft. The same operators are to drill 1 Jones (different mineral ownership), a south offset to the prospective discovery.

Cities Service 1-J Johnson, Section 8, Block A, SP Survey, Foard County wildcat 7½ miles west of Crowell, was drilling below 7,353 ft. in lime and chert. The Chester section of the Mississippian was called at 7,162 ft. and the Chappel at 7,190 ft.

Akin & Dimock 1 Lloyd Doughty, B. F. Hemphill Survey, Parker County wildcat 9 miles north of Weatherford, was dry at 3,467 ft. in lime and shale after running survey. No shows were reported.

A new Strawn-sand pay for the Garvey area of northeastern Young County has been opened by J. C. Man, Jr., and Joe K. Bailey 2-B W. P. Loftin, A. Wood Survey, ¼ mile southeast of production. Drilled to 3,523 ft., the hole was plugged back to 3,228 ft. Seven-inch casing was cemented to 3,114 ft. When plug was drilled, it tested 15 bbl. of oil an hour natural. The pay from 3,120-3,215 ft. was shot with 95 qt. and the well flowed 30 bbl. of oil the first hour.

Toklan Production Co. 1 B. Johnson, Lee C. Smith Survey, Wise County wildcat 4 miles northeast of Decatur, was running a drill-stem test of the Bend conglomerate from 5,655-72 ft.

Flippen-zone pay has been established in Central Noodle field in Jones County with completion of Clark & Cowden and Viking Corp. 1 C. F. Williams, Section 40, Block 18, T&P Survey. The well pumped 110 bbl. a day from 2,583-90 ft.

Completion of the first oil producer in northwestern Knox County, 3 miles north of Benjamin, was under way as Sinclair was rigging pumping equipment for its 1 G. H. Beavers, Section 224, Block 44, H&TC Survey. A lower Pennsylvanian lime was treated through casing perforations from 5,920-32 ft. The well then swabbed 72 bbl. of oil in 22 hours, practically the same rate of production before the treatment.

A new Canyon-sand oil pool in extreme north-central Montague County was opened with completion of the D. Houston Bolin 1 Cato Heirs, F. Robertson Survey, 1½ miles south of the Red River. The discovery flowed 120 bbl. of 30°-gravity oil a day. Pay is from 2,689-2,703 ft.

NORTH TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: W. B. Hamilton 1 L. F. Wilson, Lot 4, Blk. 48, American Tribune New Colony Subd., 10 mi. NE Archer City, TD 3,990 ft., pay 3,987 ft., flowed 79.62 bbl. oil in 8 hrs. through ¼-in. choke, CP 735 psi., TP 435 psi.

Stephens County: R. W. Fair and Don L. Choate 1 J. A. Gray, Sec. 79, Blk. 4, T&P Sur., 10 mi. N Ranger, TD 1,764 ft., elev. 1,479 ft., pay 1,749 ft., pumped 77.38 bbl. 40°-gravity oil a day, GOR 400 cu. ft.

NORTH TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: G. W. Cooper 1-F J. R. Parkey, Sec. 2, SPRR Sur. A-1078, 3 mi. SE Mankins, dry, TD 5,001 ft., elev. 1,076.8 ft., sand with show oil 4,966-70 ft.

G. W. Cooper 1-B L. F. Wilson, Blk. 57, ATNCL Sur., 7 mi. NW Scotland, dry, TD 4,870 ft., no shows.

Joe Fish et al 1 D. W. Fish, Blk. 85, Subd. "D" of Club Ranch, 8 mi. SW Archer City, dry, TD 1,415 ft.

Baylor County: Leslie B. Finnell et al 1 Wesley Harrison, Sec. 78, T&NO Sur., 3 mi. W Seymour, dry, TD 2,400 ft.

Brown County: C. L. Norsworthy, Jr. 1-A Angel Heirs, Sec. 15, Blk. 3, BBB&C Sur., 3 mi. SE Rising Star, dry, TD 946 ft.

Callahan County: McElroy Ranch Co. 1 J. H. McKinney et ux, Sec. 3154, TE&L Sur., 4 mi. NE Putnam, dry, TD 3,334 ft., elev. 1,526 ft., Caddo 3,076 ft.

Perkins Bros. 1 Jim Cottle et al, Sec. 2992, TE&L Sur., 4½ mi. S Moran, dry, TD 565 ft.

Viking Oil Corp. et al 1 Geo. J. Martin, Sec. 17, BAL Sur., NW corner of county, dry, TD 2,018 ft., elev. 1,785 ft., Gunsite 1,888 ft., King 1,920 ft.

J. K. Wadley 1 W. M. Isenhower, Sec. 2995, TE&L Sur., 5 mi. SE Moran, dry, TD 2,052 ft., elev. 1,563 ft.

Clay County: E. B. Clark, Jr., 1 Annie Coburn, Sec. 2671, TE&L Sur., 6 mi. NW Shannon, dry, TD 4,711 ft., elev. 1,042 ft.

Frank Wood 1 A. C. Douthitt, Blk. 41, Parker CSL Sur., 4 mi. SE Petrolia, dry, TD 2,005 ft., elev. 934 ft.

Erath County: M. F. Reed Trustee 1 Coy Walls, Erath CSL Sur., 1½ mi. SE Huckaby, dry, TD 3,982 ft., elev. 1,429 ft., Range 2,190 ft.

Fisher County: L. M. Lockhart 1 Mrs. Keith Newman, Sec. 14, Blk. 1, H&TB Sur., 5 mi. SE Roby, dry, TD 6,275 ft., elev. 1,972 ft., Saddle Creek 3,470 ft., Flippen 3,507 ft., Lower Caps 5,750 ft., Ellenburger 6,175 ft.

Jack County: Wrightsman Oil Co. 1 Ed Pippin, H. K. Person Sur. A-469, 5 mi. SW Jacksboro, dry, TD 5,105 ft., elev. 1,184 ft.

Jones County: Farris Oil Co. 1 Mrs. Edna Thomas, Robert A. Spencer Sur. 22, H&TB Sur., 4 mi. W Leuders, dry, TD 3,015 ft., elev. 1,615 ft., King 2,145 ft., Reef 2,750 ft.

Lester & Duffield, Inc. et al 1 Eula L. Phillips Est., Blk. 46, Lge. 334, Harrison

CSL Sur., 8 mi. W Anson, dry, TD 3,252 ft., elev. 1,776 ft.

Neely & Neely et al 1 D. W. Crumpler, Blk. 25, McMullen & McGloin 336 Sur., 3 mi. SW Radium, dry, TD 3,410 ft., elev. 1,776 ft.

Shackelford County: Robert L. Makins 1 Walker-Buckler Est., Sec. 1-B, H&TB Sur., 13 mi. N Albany, dry, TD 1,253 ft.

Stephens County: Jas. E. Snowden et al 2-E G. D. Dickie, Geo. Wagoner Sur. A-921, NW corner of county, dry, TD 2,936 ft., elev. 1,201 ft.

Taylor County: Drilling & Exploration Co. 1 Van Williams, Sec. 74, Blk. 19, T&P Sur., 1 mi. W Blair, dry, TD 3,830 ft., elev. 1,970 ft., Cook 2,852 ft., Reef 3,770 ft.

South Louisiana

Fordoche Field Has New Pay in Texas Co. Well

NEW ORLEANS.—The Texas Co. has opened new pay in Fordoche field of Pointe Coupee Parish at its 2 J. W. Green, Sr., SE NE 27-6s-8e, which came in flowing 302 bbl. of distillate per day through perforations at 9,066-84 ft., 72 shots. Flowing tubing pressure was 2,900 psi. and gravity of the distillate was 58°. The new producer is 1¼ miles west-southwest of the same operator's 1 Joseph Oscar Long et al, NW NW 29-6s-8e, which was completed in 1949 for 332 bbl. of 34.6°-gravity oil daily through perforations at 8,282-90 ft.

Final completion has been made on Shell Oil Co.'s East Baton Rouge Parish oil discovery, 1 Vivian J. Gianelloni, 5 miles west-southwest of Hope Villa. On official potential, the well flowed 370 bbl. of 47.6°-gravity oil daily through ⅛-in. choke. Production is through perforations at 10,876-90 ft. This well is located 4¼ miles east-northeast of Sunshine field, and is reported to have cored sands found in Sunshine field at an interval 400 ft. higher.

Richardson & Bass 1-G Albert Ruiz, deep wildcat in 136-14s-14e, 6 miles north of Delacroix field, St. Bernard Parish, is back in the hole after having been scheduled for abandonment. Operators tested salt water through perforations at 12,900-14 ft. and 12,862-888 ft. After the squeeze jobs now in process, production tests are due at three intervals above the initial section. Hole is bottomed at 13,003 ft.

In Manila Village field of Jefferson Parish, Tide Water Associated Oil Co. has gaged probably the highest tubing pressure of any well in the United States at its 1 John Watt. Last report indicated that the well has a tubing pressure of 9,350 psi. and calculated bottom-hole flowing pressure of 12,350 psi. The well is flowing oil and gas through perforations at 12,852-58 ft., with the gravity of oil varying. The well is still cleaning, however, the estimated flow is gaged at 72 bbl. per day through 7/64-in. choke, The hole is bottomed at 13,424 ft. and operators ran liner to total depth.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

East Baton Rouge Parish: New oil pool—Shell Oil Co. 1 Vivian J. Gianelloni, 47-8s-1e, 4 mi. NW St. Gabriel production, 5 mi. W-SW Hope Villa townsite, TD 12,100 ft., top pay 10,876 ft., perf. 10,876-90 ft., IP: 370 bbl. oil per day, ⅛ in. choke, 47° gravity, TP 4,900 psi.

Pointe Coupee Parish: New pay at Fordoche—The Texas Co. 2 J. W. Green, Sr., 27-6s-8e, top pay 9,066 ft., TD 9,629 ft., perf. 9,066-84 ft., IP: 302 bbl. distillate per day, plus 7,897,000 cu. ft. of gas, 58° gravity, TP 2,900 psi.

SOUTH LOUISIANA WILDCAT FAILURES

Calcasieu Parish: Shell Oil Co. 1 Foreign

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Mission Board, et al, 6-8s-9w, 7 mi. SE of DeQuincy, dry, TD 8,200 ft.

Cameron Parish: Stanolind Oil & Gas Co. 1 J. A. Davis, 23-14s-10w, 2 mi. NW of Cameron townsite, dry, TD 11,067 ft.

Pointe Coupee Parish: Bateman Drilling Co et al, 1 Louisiana National Bank-Summers, 33-6s-8e, 1 mi. S of Fordoche field, dry, TD 1,0322 ft.

Ohio Fields

Berea Sand Pool Is Showing Good Development

COLUMBUS.—J. W. Bebout has been developing a Berea-sand pool in southwestern Clayton Township, Perry County, with fairly good success. Four wells have been completed, two oil and two gas. The last, the 2 Mark Campbell, Section 19, topped the sand at 983 ft. and was finished at 989 ft. with 500,000 cu. ft. of gas natural. The 3 Campbell is now drilling.

H. G. Clymer et al struck gas in a shallow sand, probably the Monroe County lime, on G. M. Muhbach, Section 26, Salem Township, Washington County. The sand was found at 940 ft. and drilled 3 ft. in with a natural open flow of 425,000 cu. ft.

Wm. Hoey found gas in the Newburg sand in a test intended for the Clinton on 3 J. Amheiser, Lot 85, Harrisville Township, Medina County. Sand was logged at 2,460-87 ft. and gaged 285,000 cu. ft. natural.

Ditch & Gerig 2 Peacock, Section 24, Congress Township, Wayne County, found the Newburg at 2,870-2,960 ft. with a 300,000-cu. ft. pay at 2,942-47 ft. The well has been tubed and will be acidized.

Locations reported for the week totaled 18, scattered over 13 counties. Completions totaled 23, with Mt. Vernon field having 9 and Ashland 7.

Appalachian Field

Increase in Operations Noted in Eastern Areas

PITTSBURGH.—In Leidy Township, Clinton County, Pennsylvania, Roeder & White 1 Ludy, elevation 902 ft., gaged 3,000,000 cu. ft. of gas, with an initial rock pressure of 3,915 psi. in 48 hours. The Onondaga lime was topped at 5,904 ft., Oriskany sand at 5,925 ft. with gas at this depth, and total depth 5,925 ft. Approximately 21 wells are under way in this section. In Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-3921 Fred Musnug, elevation 2,100 ft., is drilling at 5,004 ft. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 7,505 ft.

In Steele district, Wood County, West Virginia, Morris Oil Co. has made location for 1 Delbert & Clara V. Morris, elevation 795 ft. It is on the Belleville Quadrangle, approximately 4 miles northwest of the Limestone Hill area, approximately ½ mile south of Lat. 39°, 05′ and 2 miles west of Long. 81°, 35′. Godfrey L. Cabot, Inc. 1329 O. E. Crow is drilling at 4,295 ft. Columbus Carbon Co. 1149 S. M. Wigal et al is currently at 5,250 ft.; 1153 Godfrey L. Cabot (Stephens Tract), is continuing at 4,333 ft.; 1154 H. C. McPherson et al is below 2,800 ft. United Fuel Gas Co. 6588 L. E. Blair is shut down at 5,115 ft. W & B Gas Co. 1 Elbert & Myrtle Hale is drilling at 2,550 ft.

In Tucker district, Wirt County, Godfrey L. Cabot, Inc. 1328 fee (W. T. Gant Tract), is drilling at 1,992 ft., and Louis E. Reed 1 Earl Tanner continues at 1,680 ft. In Dry Fork district, Tucker County, Cumberland & Allegheny Gas Co 1-A-425 Jason Harman, after reaching a depth of 9,085 ft., has been plugged back to 8,650 ft. and the well is now being acidized. The deep test, in Tolcott district, Summers County, Godfrey L. Cabot, Inc. 1330 S. H. Pence is rigging up. A good shallow sand gas well was noted in Trap Hill district, Raleigh County; Hope Natural Gas Co. 1-9426 James R. Trump resulted in 1,043,000 cu. ft. of gas in the Maxton sand and Big lime. Total depth is 2,923 ft.

There were 12 new locations reported in southwestern Pennsylvania and 25 in West Virginia.

California

Hancock and Texas Co. Open Two New Areas

LOS ANGELES.—After a couple of weeks during which the operators took a look at deeper formations, last week two new discoveries were completed in California: in the North Cuyama area of San Luis Obispo County, and the Castaic area of northern Los Angeles County.

The North Cuyama strike, 2¾ miles northwest of the relatively new Morales field, was Hancock Oil Co. 44-31 Hancock-Bishop. Drilled to 6,235 ft. and plugged back to 6,020 ft., it pumped 226 bbl. of 32.4°-gravity crude, 0.4 per cent cut, in 24 hours. Top of the oil sand was called at 5,644 ft.

The Castaic discovery, in 6-4n-16w, was The Texas Co. 1 Honor Farm. It flowed 34°-gravity crude into tanks at the rate of 1,500 bbl. daily, producing from perforations between 5,269-5,418 ft. Drilled to a total depth of 6,038 ft., it had been plugged back to 5,421 ft.

At Trico gas field in the San Joaquin Valley, gas production from the Atwell Island zone apparently was extended 1 mile to the southeast by H. H. Magee 1 Pacific Community, 7-25s-24e. It was completed for a gas flow of 2,500,000 cu. ft. daily, through ⅜-in. choke, from a producing interval at 3,243-51 ft.

In the Huron area of Fresno County, General Petroleum Corp. was continuing its efforts to establish oil production at its 44-14 Boston Land Co. Latest test of the wildcat was through perforations at 13,146-74 ft. On a 4½-hour test, using a 3,500-ft. water cushion, there was a fluid rise of 1,832 ft. of gassy, oily water which included 92 ft. of oil on top. Swabbing resulted in recovering fluid at the rate of 2 bbl. per hour of 20°-29°-gravity crude, cut 10-67 per cent.

In the Reyes Peak area of Ventura County, between the Cuyama Valley and Ojai, Standard Oil Co. of California has staked its 1 Hattie Russell in 11-6n-23w. It may be carried to 10,000 ft. Little drilling has been done in this general area, none within a radius of 5 miles, and all tests were relatively shallow. Socal has extensive leases, blocked during recent years.

About 1 mile west of Mountain View field in Kern County, Union Oil Co. has staked location for its 53-22 KCL in 22-30s-28e. About 1 mile south of production in Round Mountain field, Hoover Drilling Co. has staked location for its 1 Balsher in 32-28s-29e.

Another deep wildcat in the Cuyama Valley was disappointing last week, Mohawk Petroleum Co. 1 Humble-Lundstrom. Located in 2-9n-26w, hole had been carried to 11,010 ft. In the Jacalitos Hills area of Fresno County, Ohio Oil Co. also gave up on its 1 Ohio-Gulf-H. C. Lillis after reaching a depth of 11,046 ft.

CALIFORNIA WILDCAT FAILURES

Alameda County, Livermore area: Hancock Oil Co. 41-19 Hancock - Signal-A. R. Hansen, 19-3s-3e, dry, TD 3,129 ft., elev. 750 ft.

Fresno County, Jacalitos Hills area: Ohio Oil Co. 1 Ohio-Fulf-H. C. Lillis, 28-21s-16e, dry, TD 11,046 ft., elev. 800 ft.

Kern County, Antelope Valley area: Amerada Pet. Corp. 1 Still-B, 3-26s-17e, dry, TD 4,199 ft., elev. unknown.

Bowerbank Gas area: Terminal Drilling Co. 1 Janss, 21-29s-24e, dry, TD 5,010 ft., elev. 303 ft.

Edison area: San Joaquin Drlg. Co. 1 Di Girgio, 31-30s-30e, dry, TD 601 ft., elev. unknown.

Kern Bluff area: Oceanic Oil Co. and Universal Consolidated Oil Co. 8 Vedder-Parkford, 12-29s-28e, dry, TD 880 ft., elev. 781 ft.

Tejon Hills area: R. B. Jackson & B. W. McCune, 1 Jackson, 10-11n-18w, dry, TD 651 ft., elev. 1,094 ft.

Standard Oil Co. 34-16 Tejon-5, 16-11-18w, dry, Santa Margarita 420-480 ft., TD 651 ft., elev 1,094 ft.

Los Angeles County, Mint Canyon area: U.S.D. Oil Co. 1 Wright-Kovaleski, 17-5n-14w, dry, deepened from 1,480 ft., TD 1,955 ft., elev. 2,380 ft.

Newhall area: R. A. Provost & Assoc. 2 Protrana, 25-4n-16w, dry, TD 3,095 ft., elev. 1,571 ft.

San Luis Obispo County, Carrizo Plains area: Pacific Oil & Gas Dev. Corp. 85-16 Rexroth, 16-29s-19e, dry, TD 1,990 ft., elev. 3,000 ft.

Santa Barbara County, Cuyama Valley area: Mohawk Pet. Co. 48-2 Humble-Lundstrom, 2-9n-26w, dry, TD 11,010 ft., elev. 2,500 ft.

CALIFORNIA SUCCESSFUL WILDCAT

Los Angeles County, Castaic area: Texas Co. 1 Honor Farm, 6-4n-16w, completed for initial production rate of 1,414 bbl. daily through ½-in. choke from perforated interval at 5,269-5,418 ft., oil 35° A.P.I. gravity, 7 per cent cut, tubing pressure 500 psi. and casing pressure 850 psi., TD 6,038 ft., elev. 1,072 ft. New field discovery about 3½ miles northeast of Del Valle field.

Southwest Texas

New Pool Opened Near Sinton Town Airport

CORPUS CHRISTI.—Superior Oil Co. has opened a new oil pool 1 mile from the Sinton townsite, and on the same tract occupied by the municipal airport, at its 1 J. F. Odem et al, John Henderson Survey. On potential test, the well flowed 75 bbl. of 38°-gravity oil per day through perforations at 6,650-60 ft. on a 7/64-in. choke. Total depth is 8,344 ft. The new field has been named "East Sinton" by the operators.

O. W. Killam is installing pump at his prospective discovery, 2 Floyd Billings, wildcat test in CCSD&RGNG RR Survey 39, 16 miles north of Bruni, Webb County. The well is at a total depth of 2,402 ft. and operator set 5½-in. pipe at 2,392 ft. The open hole filled with oil, and operators are now preparing to gage the discovery. On a previous drill-stem test recovery was 83 ft. of pipe-line oil from 2,389½-98 ft.

Also in Webb County, Sunray Oil Corp. ran a drill-stem test from 5,081-95 ft. in 1 J. O. Walker, wildcat test on the east flank of the old Carolina-Texas field. Using ¼-in. choke and no water cushion, in 15 minutes recovery was 30 ft. of mud and 330 ft. of salt water. Bottom-hole flowing pressure was 140 and 190 psi. and shut-in pressure was 1,770 psi. Operators cored ahead in shale and shaly sand from 5,095-115 ft. and 5,155-65 ft. with no shows, and are drilling below 5,357 ft.

The Shell Oil Co. has perforated from 8,410-20 ft., 8,426-36 ft. and 8,442-83 ft. and run a drill-stem test in the 1 State Tract 342, wildcat venture in Red Fish Bay of Nueces County. Using ¼-in. and 5/16-in. chokes and 4,000 ft. of water cushion, recovery was part of the water cushion and gas, a little sand, and 15 bbl. of water. Bottom-hole flowing pressure was 2,860 psi. Operators have now set a bridge plug.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Kenedy County: Sun Oil Co. 1 State Tract 234, Laguna Madre Bay, 25 mi. E of Sarita, dry, TD 8,967 ft.

Uvalde County: Phillips Petroleum Co. 2 F. T. Kincaid, Hipolito Sotell Sur. 377, 18 mi. SE of Uvalde, dry, TD 2,955 ft.

Webb County: C. J. Brown & E. H. Stickney 1 R. Saldivar, Sur. 657, Lot 5, Garner Subd., dry, TD 1,200 ft.

Louis J. Roussel 1 Amado Perez et al, Sur. 667, 10 mi. N of Bruni, dry, TD 3,093 ft.

Rocky Mountain

Wildcatting Increasing in Julesburg Basin Area

DENVER.—Wildcat drilling through the Denver-Julesburg basin of northeastern Colorado and western Nebraska has increased, following discoveries through the area. In Morgan County, Colorado, J. M. Huber Corp. and Adams Drilling Co. are continuing their drilling in the Fort Morgan area, after completing two producers from the Muddy sand. Their second well, 1-A Lee, NW NE SE 2-2n-57w, is flowing approximately 5 bbl. of oil per hour through casing from the Muddy after perforating between 5,442-52 ft.

Trigood Oil Co. is continuing its development drilling in the Merino area, southwest of Sterling in Logan County, and reportedly plans additional wildcat drilling in this area. Macauley & Dorough of Denver has made location at 1 Anderson, SE SE SE 12-13n-51w, in the southwest Sidney area, Cheyenne County, Nebraska.

In the Big Spring area, Deuel County, Ideal Drilling Co. of Sidney is starting a wildcat at 2 Bosley, SW NE SW 19-13n-42w, near a Dakota-sand failure drilled early this year. Ohio Oil Co. is starting its eighth wildcat since discovery in western Nebraska a year ago. Its 1 Thompson, SE SE NW 21-16n-47w, is located northeast of the Gurley pool in the McCourt area, eastern Cheyenne County. Ohio's wildcat at Sunol, east of the McLernon pool, is now drilling below 4,836 ft. in the Lakota after failing to find commercial shows through the Dakota sands.

Jack Dunbar has cemented casing at 1 Jurgens, NE NW NE 1-15n-48w, wildcat in Cheyenne County, Nebraska, after reportedly finding oil shows in the test between 4,263-83 ft. The zone showed water and a scum of oil and casing will be perforated opposite the top of the sand.

British-American Oil Producing Co. is starting its first wildcat in the Nebraska portion of the basin this week with location for 1 Worth, NW NW NW 9-17n-51w, Morrill County. British-American has one small Dakota-sand oil well in Logan County, Colorado, and is testing on a second wildcat in the Sterling, Colo., area.

Mountain Fuel Supply Co. may be in the Dakota at its deep wildcat at 1 Unit, Lot 5-14-12n-100w, in the Hiawatha area, Moffat County, Colorado. The well is a tight hole, with no release of tops nor tests, but it is reported that gas shows were encountered in Mesa Verde sands. Hiawatha produces gas from shallow Tertiary sands, and the present well is the first to Dakota in the field. This is a large Tertiary structure and outcome of the well in the lower formations will considerably effect future drilling on deep basin structures through northwestern Colorado and south-central Wyoming.

Two wildcat failures were completed by Amerada Petroleum Corp. in Montana this week. The company's Park Creek wildcat in the southeastern part of the state was a failure through Amsden, topped at 4,420 ft., and no shows were reported for the well. This well continued the company's wildcat-drilling campaign on the northwest flank of the Black Hills uplift. At Spindletop, Fergus County, in the central part of the state, the company plugged its 1 Wildin after testing water in Mission Canyon formation. The well was drilled into Cambrian.

There were 27 completions, with 16 in Wyoming, 3 in Colorado, 5 in Montana, 2 in western Nebraska, and 1 in Utah. In Wyoming, S. W. McLaughlin of Rangely completed his Deer Creek discovery, south of Big Muddy field, with the well flowing 30 bbl. of oil daily from Dakota. The well flowed water from Sundance. Lakota Petroleum Corp. made a discovery at West Hay Creek, Weston County, with the well flowing 130 bbl. of oil daily from Newcastle.

WYOMING SUCCESSFUL WILDCATS

Deer Creek, Converse County: S. W. McLaughlin 1 State, NW NE SE, 7-32n-76w; 5,813 TD; PB 5,109, flowed 30 bbl. oil in 14 hours; 7-in. casing at 5,085; Shannon 1,553, Frontier 3,819, Muddy 4,965, Dakota 5,090, Lakota 5,168, Morrison 5,207, Sundance 5,550, Basal Sundance 5,700.

West Hay Creek, Weston County: Lakota Petroleum Corp. 1 Sterling, SW NE SW 6-45n-66w; 6,421 TD; flowed 130 bbl. oil per day through 5/16-in. choke, 5½-in. casing at 6,387; Newcastle 6,396-6,402 and 6,406-6,414.

WYOMING WILDCAT FAILURES

Orpha area, Converse County: Steelco Drilling Co. 1 Whiting, SE SE NW 11-33n-73w; 7,734 TD; plugged and abandoned; Lance 2,986, Fox Hills 6,775, Lewis 7,117, Teapot 7,665.

Green Mountain, Fremont County: British-American Oil Producing Co. 1 Govt.-Boesel, NW EW SW 2-28n-94w; 2,850 TD; plugged and abandoned; Chugwater 835, Alcova 1,032, Dinwoody 1,767,

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COLORADO WILDCAT FAILURE

NE Las Animas, Bent County: Shell Oil Co. 1 State, NW NE NE 3-21s-50w; 6,177 TD; plugged and abandoned; Dakota 629, Morrison 935, Pennsylvanian 3,319, Mississippian 5,239, Simpson 5,609, Arbuckle 5,644, Basal Cambrian sand 6,132.

COLORADO SUCCESSFUL WILDCAT

Ft. Morgan, Morgan County: Adams Drilling and J. M. Huber Corp. 2 Lee, SW SE NE 2-2n-57w; 5,478 TD; pumped 25 bbl. oil per hour; 5½-in. casing at 5,478; Muddy 5,438; perf. 24 holes 5,444-48; 87 holes 5,440-52.

MONTANA WILDCAT FAILURES

Park Creek area, Carter County: Amerada Petroleum Corp. 1 Govt., NE NE NE 18-6s-57e; 4,515 TD; plugged and abandoned; Greenhorn 1,222, Mowry 2,005, Newcastle 2,200, Skull Creek 2,282, Dakota 2,545, Morrison 2,773, Ellis 2,927, Rierdon 3,310, Gypsum Springs 3,360, Spearfish 4,009, Minnekahta 4,025, Opeche 4,058, Amsden 4,420.

Spindletop, Fergus County: Amerada Petroleum Corp. 1 Wildin, NE SW NE 27-13n-23e; 3,533 TD; plugged and abandoned; Otter 893, Kibbey 1,257, Charles 1,508, Mission Canyon 2,165, Lodgepole 2,654, Base Mississippian 3,275, Cambrian 3,358.

Marias River Dome, Liberty County: L. B. O'Neil 1 Alice Brown, NW SW NW 29-30n-5e; 4,197 TD; plugged and abandoned; Kootenai 1,640, Sunburst 1,960, Yellow 2,030, Ellis 2,160, Madison 2,460, Devonian 3,235, Potlatch 3,410, Jefferson 3,540.

UTAH WILDCAT FAILURE

Black Rock, Millard County: El Capitan Drlg. Co. 1 James, C SE SW 17-25s-9w; 3,682 TD; plugged and abandoned; Black Arkosic sand 3,141, Koster 3,490-3,501.

NEBRASKA WILDCAT FAILURE

Keystone area, Keith County: Zeke Lohman 1 Hansen, C NE 27-15n-37w; 4,018 TD; plugged and abandoned; Niobrara 1,785, Greenhorn 2,665.

Eastern Texas

Grayson County Well Has Flow from Ellenburger

DALLAS.—A. O. Phillips-The Texas Co. 1 F. W. Reast, E. L. Stickney Survey, 1 mile south of Sandusky in northwestern Grayson County, was washed in to clean and then flowed 10 bbl. of oil an hour through ¼-in. choke. Production is natural from open hole at 7,740-7,852 ft. in the Ellenburger. Oil was 42° gravity. The well is 1½ miles northwest of an Ellenburger discovery made earlier by Texas on Marshall land. It also is 1½ miles southwest of L. O. McMillan 1 Chambers, recent Oil Creek discovery which had tested negative in the Ellenburger.

E. L. Howard and Cooper Herring 1 Odell Clewis, A. Hendley Survey, is a new Woodbine-sand oil discovery in southeastern Anderson County, 10 miles east of Slocum. On a drill-stem test from 5,280-90 ft. with ¼-in. choke, the well is reported to have made 6 to 8 bbl. of 40°-gravity oil in 23 minutes.

Texas will drill 1 M. T. Holmes et al, a deep wildcat 2½ miles northeast of Tennessee Colony townsite in the northern portion of Anderson County. The 10,000-ft. test is in Francis Betick Survey A-105. It is about 2½ miles northeast of Bering Oil Co. et al 1 Mary W. Hopkins, nearest producer in Tennessee Colony field. It was completed April 4, 1950, flowing at the rate of 93.15 bbl. of oil a day from perforations from 8,869-79 ft. in the Upper Rodessa.

Two gas-distillate areas of Harrison Coun-

ty have been given 1-mile extensions. The southwest side of the Woodlawn Pettitlime gas-distillate area of northeastern Harrison was extended 1 mile southwest by Stanolind Oil & Gas Co. and Continental Oil Co. 1 Britton, Watkins Survey. The well was being tested without gage. Warren Oil Corp. 1 Bussey, E. A. Merchant Survey, extended the North Lansing Rodessa area of northwestern Harrison, 1 mile northwest of production

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

Ellis County: Coffield & Guthrie, Inc. 1 W. C. Burford, C. V. Shaefer Sur., 2 mi. E Alma, dry, TD 4,995 ft., elev. 475 ft., Paluxy 3,045 ft., Glen Rose 3,228 ft., Lower Glen Rose 3,901 ft., Travis Peak 4,267 ft.

Houston County: B. G. Byars, Ralph Spence & P. G. Lake 1 Beulah Sheridan, G. Bordilla Sur., 6 mi. W Grapeland, dry, TD 6,025 ft., elev. 297 ft., Austin 3,552 ft.

Limestone County: Anco Gas Corp. 1 J. R. Wallace, Randolph Slater Sur., 4 mi. W Coolidge, dry, TD 1,767 ft., Woodbine 1,674 ft.

Navarro County: John F. Dill 1 Kyser Est., R. C. Dooms Sur. A-240, 1 mi. E Powell, dry, TD 1,350 ft.

Mississippi

Completion Troubles Slow Several Wildcat Tests

JACKSON.—Danciger Oil & Refining Co. and William Helis 2 George Armstrong, wildcat, 20-5n-2w, Adams County, continues to have completion troubles. A second test was made of the Parker zone of the Wilcox following two squeeze jobs on first perforations. Following a dry test on the squeeze job, operators perforated the casing from 6,436-39 ft. with 18 shots. Drillstem test of these perforations was then run using ¼-in. top and bottom chokes and 630 ft. of water cushion. Top pressure built up to 23 psi. in 18 minutes, but decreased to zero at the end of 23 minutes. Swab was then run with recovery being salt water and mud with no show of oil. These perforations were then squeezed and at last report operators were preparing to perforate above the sand for another squeeze job before attempting another test of the Parker zone.

George Vasen, at last report, was pulling the 135th consecutive core at his deep wildcat test in Stone County, 1 Tung Oil Corp., SW NE 9-2s-11w, 3 miles northeast of Wiggins, Miss. Total depth of the hole is 18,009 ft. Although the depth of the hole is continuously being carried to deeper horizons, the operators are still able to make a round trip in approximately 35 to 40 hours.

In Pickens field, Yazoo County, Mississippi, Carter Oil Co. 1 Wilson-Wilburn Unit, NW SE 30-12n-3e, northeast diagonal offset to the Lower Cretaceous discovery in the field, failed to have shows in cores taken at 7,692 ft., top of sand equivalent to the producing zone in the discovery well. Recovery from drill-stem test at 7,689-729 ft. was 1,400 ft. of salt water, 150 ft. of mud, and 570 ft. of water cushion. At present time operators are preparing to core at 7,745 ft.

Humble Oil & Refining Co. has started clearing location for its second test in the new South Carlton field, Baldwin County, Alabama. Test will be 2 J. H. Wall Estate, 22-3n-2e. If successful, this will make a two-county field of South Carlton, which was opened recently by Humble 1 J. H. Wall Estate, which previously was carried as the 1 Marion W. Davies et al, and spotted in 15-3n-2e, Clarke County.

MISSISSIPPI WILDCAT FAILURES

Adams County: Kemp Drilling Co. & Petersen Drilling Co. 1 U. S. A., 24-5n-1w, dry, TD 7,006 ft.

Sharkey County: Tide Water Associated Oil Co. 1 Panther-Burn Co., 17-14n-6w, dry, TD 3,538 ft.

Wayne County: Walter E. Sistrunk 1 U. S.-A., 24-6n-7w, dry, TD 6,510 ft.

Canadian Fields

Devonian Strikes Pace Active Week

CALGARY.—Western Canada's oil industry recorded four successes the past week: California-Standard Co. struck a Devonian reef oil discovery at its Acheson wildcat north of Leduc-Woodbend field; Socony-Vacuum Exploration Co. made an important Devonian oil strike at its Flint wildcat about 35½ miles southeast of Leduc-Woodbend; extensions were registered at Campbell basal Cretaceous sand field and Joseph Lake Viking sand field.

The Acheson well, Cal-Standard-Acheson Province 1 is located in LSD 13, 2-53-26w4. The discovery was made in top of the D3 zone with initial drill-stem test at 4,962-73 ft. bringing a flow of 36.5°-gravity crude at the rate of 702 bbl. daily. It is nearly 4 miles north-northeast and considerably higher on the D3 than the Imperial-Stony Plain discovery well, which recently found a thin section of oil-bearing D3. Stony Plain, after perforating 1 ft. at the top of D3, flowed at a rate exceeding 100 bbl. daily, and is being placed on pump to determine potentialities. If Acheson has tapped the same reef (a reasonable possibility) a new large oil field may be in the making a few miles west of Edmonton. The Acheson well is deepening and testing at

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intervals in the D3, to determine thickness of pay.

The Socony discovery, Socony-Flint 1, is in LSD 13, 17-45-21w4. The well, in the New Norway area, about 12 miles southwest of Camrose, ran its initial drill-stem test from 4,500-14 ft., and gave a flow of around 34°-gravity crude oil at a rate of 700 bbl. daily. The Devonian horizon in which the discovery has been made is not yet determined.

The Campbell extension success, High Crest-Long Island-Campbell 1, in LSD 16, 21-54-25w4, is located ¼ mile south of Redwater Leaseholds 1 producer, and about ⅜ of a mile southwest of their 4 oil well. During a 1-hour test of the Cretaceous gun-perforated section at 3,749-54 ft., the well gave a rise of 1,300 ft. of clean crude oil. Pumping unit is now being installed.

At Joseph Lake, Superior-Joseph Lake 18, southward evaluation test in LSD 15, 11-50-22w4, ¼ mile south of the 16 success, flowed oil during a Viking sand drill-stem test. A 20-minute test at 3,292-97 ft. gave a flow of oil in 17 minutes, plus a natural gas flow rate with maximum 298,000 cu. ft. daily.

Twenty-three more Alberta wells were completed, 20 of which were oil wells, 1 gas well, and 2 failures. Total completions since the first of this year now stand at: 443 oil wells, 25 gas wells, and 120 dry holes.

Illinois-Ind.-Ky.

Hamilton County Wildcat Produces from Palestine

OPENING not only a new pool, but also a new pay zone for that part of the state, LaGrange Petroleum Co. 1 Howard, SW SW SW 16-7s-6e, southern Hamilton County, Illinois, produced 285 bbl. of clean oil in an 8-hour swabbing test. The new pay zone is the Palestine sand, logged at 2,071-78 ft. Casing is on top of the sand. The well was not shot. Pumping equipment is being set up.

Location of the well is near the Saline County line and about ¾ mile northeast of a lone McClosky lime well in the Long Branch pool. Nearest other production is about 3 miles to the north in the Walpole area.

About 9 miles to the east of the LaGrange well in the SE NE SE 24-7s-7e, in the northeast corner of Saline County, and about 1½ miles from nearest production, J. F. Balderson and Hugh West are putting their 1 Bruce on the pump following swabbing tests in which it produced at an average rate of 5 bbl. of oil and 1 bbl. of water per hour. Its pay is the Aux Vases zone with saturation at 2,935-55 ft.

Only 1¾ miles northeast of this well in the southwest corner of White County, George & Wrather are testing their 1 Douglas, SW SE NW 17-7s-8e, another prospective Aux Vases discovery well. Its pay is at 2,967-82 ft., opposite which an alloy section had been run in the casing string, cemented at 3,119 ft. on a drill-stem test, previously reported, the well got 405 ft. of oil and gas-cut mud along with some clean oil.

Sohio Petroleum Co. 1 Fleming, NW NE SE 2-2n-5e, a wildcat south of the Kenner pool, 6 miles southwest of Flora, in the southwest corner of Clay County, Illinois, swabbed at the rate of 5 bbl. of oil per hour in testing Rosiclare lime oil showings at 2,871-76 ft. The well, drilled to 3,000 ft., also had some showings in McClosky at 2,898-2,939 ft.

Deep Rock Oil Corp. appears to have a small well in its 1 Johnpeter, NE SW SE 23-1n-3w, a rank wildcat test in the extreme southern part of Clinton County, near the Washington County line. Testing the Devonian at 2,554-64 ft., the well is estimated good for 30 to 40 bbl. of oil daily. It is 6 miles from any other production and nearly 20 miles from nearest lime production.

Production of the Parkersburg pool in Richland County, same state, is being extended to the northeast by George & Wrather, whose 1 Provines, NE SE NW 34-3n-14w, flowed more than 50 bbl. per hour while testing McClosky lime at 3,115-28 ft. Total depth is 3,159 ft. The area is about 6 miles southeast of Olney.

John B. Buchman and C. E. O'Neal 1 Sturm, SE SW NE 36-3s-10e, which opens a new pay zone and extends production of the North Calvin area of the Phillipstown Consolidated pool, White County, Illinois, ¾ mile to the west, flowed at an average rate of 42 bbl. per hour during a 24-hour gage on 1-in. choke. Pay zone is O'Hara lime at 3,096-3,106 ft. The area is about 4 miles southwest of Grayville.

In the Indiana sector of the district, Carter Oil Co. 1 Drake, NW SE SE 14-9n-10w, 4 miles northwest of Shelburne, Sullivan County, produced 60 bbl. of oil in a 12-hour swabbing test in broken Devonian lime at 2,141-2,258 ft. Nearest production is in the Martz pool, about 2 miles to the east.

Noah Petroleum Co. 2 Mumford, NW NW NW 27-3s-13w, about 5 miles northeast of Griffin and about 1½ miles from nearest production in the East Griffin area, Gibson County, is being deepened in saturated Cypress sand following swabbing tests at 2,435-41 ft., in which it produced an estimated 50 bbl. of oil per day. It is 8 miles southwest of Owensville.

In western Kentucky, C. R. Craft 1 Beasley, 7-Q-26, 10 miles northeast of Henderson and more than a mile from production in northeastern Henderson County, showed gas and recovered 50 ft. of clean oil and 145 ft. of muddy oil in a drill-stem test of Aux Vases lime at 1,880-1,905 ft. There was no indication of water. Casing has been run for completion.

ILLINOIS SUCCESSFUL WILDCAT

Wayne County: Skiles Oil Corp. 1 Allison, SW SW NW 23-2s-9e, IP 285 bbl., lower O'Hara 3,271-87 ft. and Rosiclare 3,307-12 ft., TD 3,317 ft.

ILLINOIS WILDCAT FAILURES

Adams County: H. McClintock 1 Bruns, SE SE SW 34-1n-6w4th P.M., dry, TD 1,007 ft.

Effingham County: Joe Reznik 1 McKay-Engle, SE SE NW 32-9n-4e, dry, TD 1,723 ft.

Fayette County: Mark Twain Oil Co. 1 Sparks, SW NE NW 22-5n-1w, dry, TD 1,585 ft.

Gallatin County: Skiles Oil Corp. 1-A Abell, SE SW NE 26-8s-9e, dry, TD 919 ft.

Jasper County: J. R. Benson 1 Moncel, SW SW SW 2-6n-9e, dry, TD 3,007 ft.

Madison County: Mazzarino & Neary 1 Albert, SE SW SW 1-5n-6w, dry, TD 670 ft.

Montgomery County: L. L. Benoist 1 McLean, NW NW NE 14-7n-4w, dry, TD 851 ft.

Mayor Drilling Co. 1 Bost, NE SE SE 8-8n-2w, dry, TD 2,176 ft.

Washington County: Castle Drilling Co. 1 Struckman, SE SW NW 14-2s-1w, dry, TD 1,672 ft.

Wayne County: Bell Brothers 1 McCall, SE NW NE 23-2s-7e, dry, TD 3,495 ft.

J. L. Kennard 1 McNeil et al., NE SE SW 36-1s-6e, dry, TD 3,307 ft.

White County: T. B. Dirickson 1 Goodman, NW SE SW 22-4s-10e, dry, TD 3,230 ft.

INDIANA SUCCESSFUL WILDCAT

Posey County: Skiles Oil Corp. 1 Geiger, SW SW SE 6-7s-14w, IP 24 bbl., Clore sand 1,838-46 ft., TD 2,896 ft.

INDIANA WILDCAT FAILURES

Knox County: B-L-S Drilling Co. 1 Killian Heirs, NW NW NW 27-5n-7w, dry, TD 965 ft.

National Associated Petroleum Co. 1 Miller, SW NE NW 9-4n-8w, dry, TD 1,395 ft.

Vanderburgh County: National Associated Petroleum Co. 1 Hessenaur, SE SW SE 35-5s-10w, dry, TD 2,413 ft.

G. L. Reasors 1 Strott, SW NW NE 11-5s-11w, dry, TD 2,470 ft.

Warrick County: Calvert Drilling Co. 1 Black, SW SE SW 5-5s-6w, dry, TD 1,415 ft.

Calvert Drilling Co. 1 Hendrickson, SW SE SW 1-5s-7w, dry, TD 1,517 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

McLean County: Felmont Oil Co. 1 Hayden, N½ SW NE SE 13-N-26, IP 40 bbl., Waltersburg 1,669-1,704 ft., TD 2,575 ft. (Opens Beach Grove pool.)

WESTERN KENTUCKY WILDCAT FAILURES

McLean County: J. C. Ellis-Sun Oil Co. 1 McDaniel, SE NE SW 8-N-25, dry, TD 2,016 ft.

Felmont Oil Co. 1 Randall, SE SW SE SE 11-L-28, dry, TD 2,188 ft.

Joe Reznik 1 Gregory, SE NE SE 9-P-26, dry, TD 1,732 ft.

Muhlenberg County: Basin Drilling Co. et al,. 1 Kelly, SE SE SW NW 17-I-28, dry, TD 2,013 ft.

EASTERN KENTUCKY

ASHLAND.—In Big Sinking pool in north-central Lee County, Ashland Oil & Refining Co. is drilling at 657 ft. on 147 Flahaven Land Co. Well is slated to test various zones of production in the Corniferous expected at about 825 ft.

In Pike County sector of the big Sandy gas field, Kentucky-West Virginia Gas Co. completed 957 George W. Priest for 1,212,000 cu. ft. of gas daily from Maxon (Mississippian) sand from 2,715-86 ft., total depth. A bottom-hole pressure of 500 psi. was established in 48-hour period.

EASTERN KENTUCKY WILDCAT FAILURE

Breathitt County: Bedrock Petroleum Co. 1 Mintie Sue Lindsey, Hunting Creek, dry, TD 2,167 ft., Big Six (Silurian) sand 2,093 ft., slight show oil and gas.

Oklahoma

Alfalfa County Wildcat Tests Oswego Oil Show

ALFALFA County, in northwestern Oklahoma, may be getting its first oil producer with testing under way by Cecil S. Davis and associates at their 1 Glidewell, SW SW NE 14-24n-11w. The wildcat, located on the McWillie structure, near Helena, is testing showings encountered in Oswego lime, on which 7-in. oil string was run to 5,857 ft.

Drilled out to 5,876 ft. and acidized with 3,000 gal., the well got only a small show of

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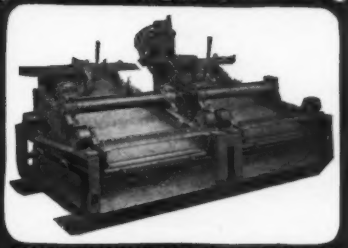

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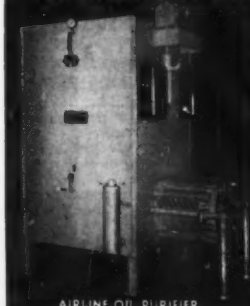

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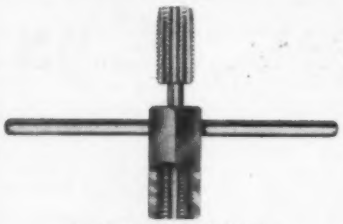

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oil and gas. With hole deepened to 5,882 ft., tests got increased oil showings and a stronger gas "kick." Hole then was deepened, drilling with oil circulation, to 5,935 ft., where swabbing tests recovered load oil and produced at the rate of 2 bbl. of new oil per hour. Testing continues.

The test, the fourth for the area, was started with drilling projected to 100 ft. in the Mississippian, expected around 6,500 ft.

Deardorf Oil Corp. 1 Gould, NE SW NW 33-20n-5e, which opens a new pay zone for the Garr pool, on the Pawnee-Payne County line, flowed at the rate of 66 bbl. of oil per hour on tests through ¼-in. choke. With flow restricted to 1/32-in. choke, it produced at the rate of 28 bbl. per hour, and later, on 1/64-in. choke, it made 10 bbl. per hour. The new pay is the Peru sand, topped at 2,847 ft. and drilled to 2,860 ft. The well is on the north flank of pool in southern Pawnee County and extends production slightly. Main production of the pool is from the Red Fork, Misener, and Wilcox sands.

Production of the Palacine pool, Stephens County, has been extended northeastward by Fred Morgan and Max Pray at their 1 Christy, NE SW NW 15-2s-6w, which flowed 35 bbl. of oil per hour through ½-in. choke from casing perforations at 3,229-50 ft., opposite a Pennsylvanian sand zone. Total depth is 3,358 ft. with 7-in. casing at 3,355 ft., through the pay.

The old, shallow Milroy pool on the Stephens-Carter County line, received a boost with the opening of a new pay zone by The Texas Co. at its 2 Harley, SW NW SE 24-2s-4w. The new zone, another shallow Pennsylvanian sand, is producing from casing perforations at 1,773-93 ft. The well flowed 322 bbl. in the first 12 hours, making 215 bbl. the first 6 hours through open casing, and 107 bbl. in the next 6 hours through ½-in. choke. Hole had been drilled to 2,250 ft. and plugged to 2,168 ft.

Another link in joining the West Morvin pool with the main Morvin pool, Pottawatomie County, is being proved by production tests at Lon B. Turk and associates 1 Fleming, NE SE SW 31-9n-3e, an east-side outpost for the former pool. Producing from Hunton lime, the well kicked off after swab had been run twice, and flowed 60 bbl. in the first 3 hours through ½-in. choke. On 1/66-in. choke, the flow was gaged at 10 bbl. per hour. Casing, run to 5,080 ft., is perforated at 4,901-18 ft. and 4,928-36 ft. Total depth is 5,180 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Oklahoma County: Ashland Oil & Refining Co. 1 Shannon, NW NW SE 6-14n-2w, elev. 1,185 ft., flowed 153 bbl. of oil per day from Bartlesville topped at 5,970 ft., TD 5,990 ft. Hogshooter 5,063 ft., Checkerboard 5,612 ft., Big lime 5,711 ft., Oswego 5,764 ft., Prue 5,825 ft.

Pottawatomie County: Olson Drilling Co. 1-A Moore, NE NE SW 6-8n-5e, elev. 922 ft., flowed 115 bbl. of 39°-gravity oil per day from Earlsboro topped at 3,695 ft., TD 3,713 ft., Hogshooter 2,073 ft., Layton 2,149 ft., Checkerboard 2,423 ft., Cleveland 2,439 ft., Wewoka 2,633 ft., Earlsboro 3,695 ft.

Gulf Oil Corp. 9 Miller, NE SE SE 18-8n-5e, pumped 130 bbl. of oil per day from first Wilcox topped at 4,285 ft., Hogshooter 1,969 ft., Checkerboard 2,354 ft., Calvin 2,499 ft., Senora 2,064 ft., Inola 3,498 ft., Mayes 3,730 ft., Woodford 3,865 ft., Misener 3,999 ft., Hunton 4,020 ft., Sylvan 4,040 ft., Viola 4,140 ft., dolomite 4,261 ft.

OKLAHOMA WILDCAT FAILURES

Cotton County: Farris Oil Co. 1 Hooper, SW NW SE 5-5s-9w, dry, TD 2,005 ft., sand 1,142 ft., sandy conglomerate 1,265 ft., sand 1,739 ft. and 1,776 ft., coal 1,905 ft., sand 1,975 ft.

Creek County: L. B. Jackson 1 Bishop, NE NW NE 12-15n-8e, dry, TD 3,759 ft., Dutcher 3,126 ft., Woodford 3,615 ft., Sylvan 3,640 ft., Viola 3,664 ft., Wilson 3,718 ft., second Wilcox 3,725 ft.

Hughes County: Jones-Shelburne and Diamond 1 Price, NE NE SW 2-7n-8e, elev. 878 ft., dry, TD 3,480 ft., first Booch 2,850 ft., second Booch 2,948 ft., Gilcrease 3,047 ft., Cromwell 3,309 ft.

Jefferson County: R. V. Dillard 1 Cashe, SE SE NW 5-6s-6w, elev. 891 ft., dry, TD 3,509 ft., sand 2,545 ft.

W. E. Smith 1 Pruitt, SE SE SE 2-4s-5w, dry, TD 3,526 ft., Canyon 2,350 ft.

Kay County: Lindas Oil, Inc. 1 Dunlap, NW NE NW 19-26n-2e, elev. 980 ft., dry, TD 4,309 ft., Layton 2,905 ft., Checkerboard 3,221 ft., Big lime-Oswego 3,379 ft., Mississippian 3,825 ft., Woodford 4,245 ft., Misener 4,254 ft., dolomite 4,259 ft., Wilcox 4,278 ft.

(Continued on page 138)

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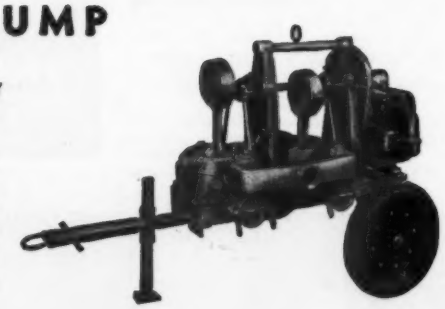

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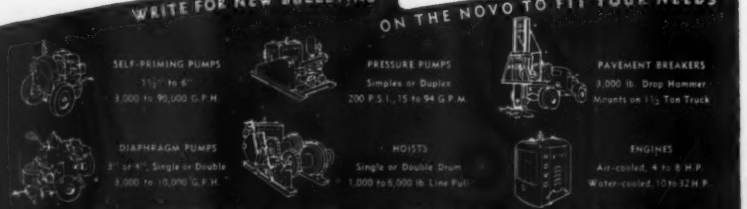

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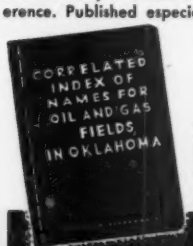

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First Seven Months of 1950 Show Substantial Completions, Footage Gains

by Polly DeArmond

CUMULATIVE figures for the first 7 months of each year show that 1950 was more than 2,000 completions and over 8,860,000 ft. higher than 1949. Total wells for the comparative period were up 9.5 per cent while footage increased 11.2 per cent over the previous year. The ratio of successes remained about the same, with this year's producers down only 0.06 per cent. Excluding all holes drilled expressly as input or disposal wells, 65.8 per cent of all wells completed during the period in 1950 resulted in oil or gas production, compared with 66.4 per cent for the preceding year.

Cumulative Gains

Two areas led in this record-breaking drilling campaign: the southwestern section accounted for a greater actual number of completions and footage, but the Mid-Continent reported the highest percentage gains. Texas and New Mexico increased 1,435 wells or 17.5 per cent, and 6,692,783 ft., or 19.1 per cent, over 1949. The Oklahoma-Kansas-Nebraska-Missouri group was up 1,125 completions, or 26.5 per cent, and 3,667,310 ft., or 25.1 per cent.

The southern states of Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida, and Tennessee gained 188 wells and 1,309,003 ft. for increases of 11.3 and 14.1 per cent respectively this year. Slightly shallower wells were drilled during the 1950 period in the north-central district (including Indiana, Kentucky, Illinois, Ohio, and Michigan), which increased 319 completions (some 8 per cent) but dropped 44,566 ft. (practically no change percentage-wise).

Cumulative Losses

The West Coast showed the greatest decreases in the comparison of the two years. Completions were off 543 wells, or 35.4 per cent, and footage fell 1,939,323 ft., or 30.9 per cent. Operations in New York, Pennsylvania, and West Virginia reflected declines of 350 wells, or 17.6 per cent, and 543,852 ft., or 15.2 per cent. The Rocky Mountain region (Colorado, Utah, Montana, Wyoming, and the Dakotas) was down 86 completions (15 per cent) and 277,587 ft. (12.1 per cent) from January-July of last year.

July 1950 Vs. July 1949

Completions during July 1950 increased 624 wells (19.1 per cent) over the same month 1949, and footage gained 2,275,569 ft. (20.3 per cent). As in the cumulative comparison, successes were down very little: 63.1 per cent of wells drilled exclusively for oil or gas found production during the month this year against 64.8 per cent for July last year.

Deeper development in Texas and New Mexico resulted in a 36.5 per cent gain in footage accompanied by a 25.7 per cent increase in completions. The north-central section was up 26.8 per cent in wells and 23.9 per cent in footage drilled, while the Mid-Continent division increased 22.3 per cent both in wells and footage. Appalachian activity continued its 2-month rise, up 24.1 per cent in completions and 18.8 per cent in footage.

SUMMARY OF COMPLETIONS—JULY 1950

	Total comp.	Oil	Gas	Dry	Under 2,500-ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	57	29	0	28	57	0	0	0	0	0	82,992	§63
Pennsylvania	165	85	14	66	154	11	0	0	0	0	263,740	283
West Virginia	51	6	40	5	32	15	4	0	0	0	145,547	¶157
Ohio	99	36	18	45	61	37	1	0	0	0	193,102	139
Kentucky	118	54	10	54	97	21	0	0	0	0	194,211	93
Illinois	346	149	1	196	170	176	0	0	0	0	773,453	333
Indiana	191	82	7	102	159	32	0	0	0	0	327,143	200
Michigan	112	35	5	72	71	40	1	0	0	0	249,865	158
Kansas	335	169	31	135	51	282	2	0	0	0	1,066,429	404
Neb., Mo., Iowa	12	4	0	8	1	10	1	0	0	0	46,932	37
Oklahoma	504	295	35	174	143	268	62	11	20	0	1,796,425	771
Texas	1,344	882	51	411	376	449	394	101	19	5	5,803,902	1,614
North	241	125	1	115	134	80	27	0	0	0	634,969	159
West Central	166	83	2	81	82	70	14	0	0	0	469,194	128
West	449	381	3	65	76	106	220	33	11	3	2,372,067	706
Panhandle	65	44	16	5	3	60	2	0	0	0	203,846	134
East	58	36	2	20	14	28	13	3	0	0	233,996	93
Gulf Coast	197	124	13	60	16	52	71	49	7	2	1,184,110	240
Southwest	168	89	14	65	51	53	47	16	1	0	705,720	154
Louisiana	195	119	8	68	70	24	31	32	32	6	1,120,921	248
Northern	110	61	7	42	69	16	17	5	3	0	363,752	89
Southern	85	58	1	26	1	8	14	27	29	6	757,169	159
Arkansas	40	20	1	19	12	22	1	5	0	0	129,530	42
Mississippi	21	7	1	13	0	3	11	6	1	0	143,922	12
Ala., Ga., Fla., Tenn.	‖7	2	0	‖5	1	3	2	1	0	0	32,448	‖11
Montana	27	11	3	13	18	6	2	1	0	0	68,431	71
Wyoming	58	25	0	33	7	32	10	8	1	0	268,447	**143
Colorado	11	1	1	9	0	6	5	0	0	0	51,262	35
Utah	3	1	1	1	2	0	0	1	0	0	12,389	19
New Mexico	30	21	2	7	8	14	3	5	0	0	112,390	††135
California	161	102	3	56	56	64	26	9	5	1	619,337	182
Dakotas	1	0	0	1	1	0	0	0	0	0	2,155	5
Total July 1950	3,888	†2,135	232	*1,521	1,547	1,515	556	180	78	12	13,504,973	‡5,155
Total June 1950	4,079	2,349	278	1,452	1,452	1,666	642	205	103	11	14,950,604	5,118
Total July 1949	3,264	1,803	253	1,208	1,285	1,337	417	146	69	10	11,229,404	4,586
Cumulative 1950	24,146	13,842	1,573	8,731	8,900	9,587	3,787	1,236	560	76	88,321,421	....
Cumulative 1949	22,058	12,528	1,565	7,965	8,140	9,172	2,889	1,235	546	76	49,457,653	....

*Incl. 135 service wells: N. Y. 28, Pa. 63, Ohio 6, Ill. 2, Mich. 11, Kans. 3, Okla. 10, No. Tex. 3, W. Tex. 1, Tex. Gulf 1, No. La. 1, So. La. 1, Ark. 5. †Incl. 32 distillate wells: Okla. 3, No. Tex. 1, W. Tex. 7, E. Tex. 1, Tex. Gulf 4, S.W. Tex. 3, No. La. 2, So. La. 10, Miss. 1. ‡Incl. all wells rigged up and/or drilling at end of month. §Incl. 2 Md. ¶Incl. 2 Va. ‖Incl. 1 Tenn. comp. at 840 ft. and 6 Tenn. rigs. **Incl. 3 Idaho. ††Incl. 5 Ariz.

XUM

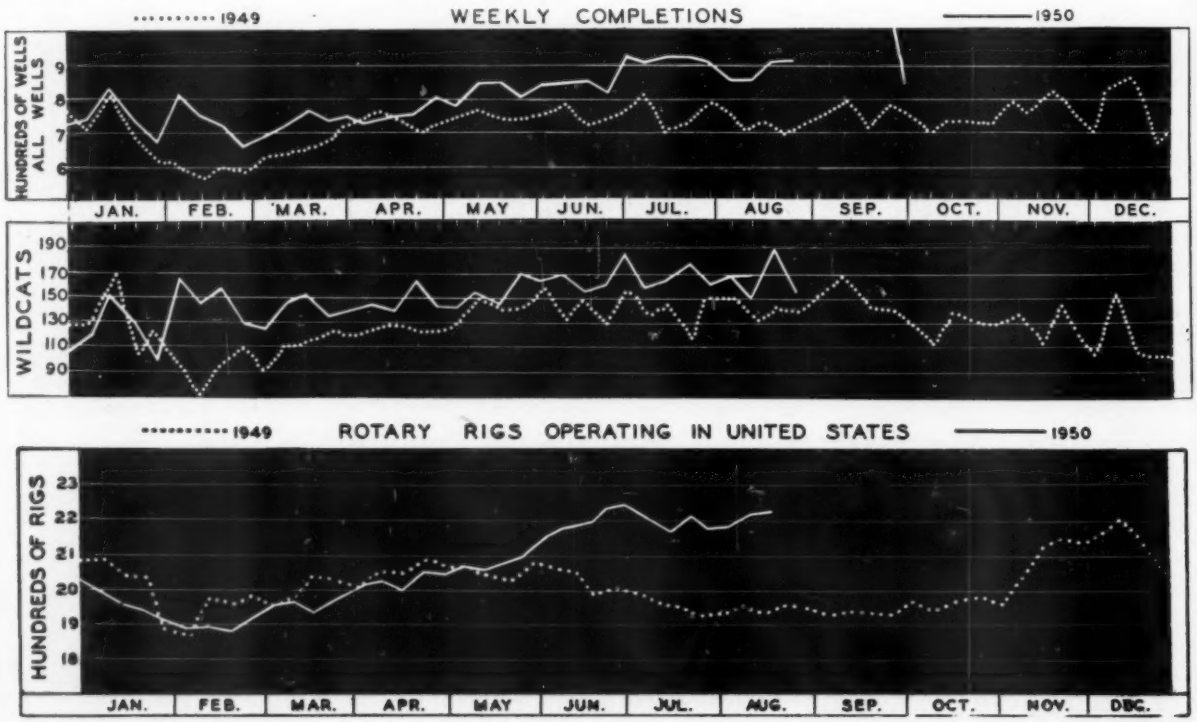
CURRENT STATISTICS

EXPLORATION

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED AUGUST 26, 1950

	Total of all wells					Aug. 26		Wildcat completions and discoveries					Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	18	10	0	*8	26,208	431	698	0	0	0	0	0	0	0	0	0	0
Pennsylvania	25	10	7	†8	47,756	874	1,105	0	0	0	0	0	0	0	1	2	3
West Virginia	17	1	13	3	34,119	436	322	0	0	0	0	0	0	0	13	15	28
Ohio	23	9	5	†9	50,644	644	717	0	0	0	0	0	1	0	2	7	10
Indiana	37	16	1	20	42,647	1,057	862	1	0	0	6	7	38	0	1	181	220
Kentucky	28	8	5	15	62,315	728	588	1	0	0	5	6	18	0	1	59	78
Illinois	77	33	0	44	162,531	1,733	1,614	1	0	0	12	13	33	0	1	392	426
Michigan	24	11	0	§13	58,922	559	629	3	0	0	6	9	22	0	4	186	212
Kansas	84	39	10	35	271,153	2,421	2,104	3	0	0	13	16	65	0	7	387	459
Nebraska	4	2	0	2	13,893	70	19	0	0	0	2	2	4	0	1	34	39
Oklahoma	114	57	2	‡55	401,964	3,533	2,820	3	0	0	13	16	107	6	11	431	555
Texas	316	210	14	92	1,326,281	10,601	8,845	3	1	0	46	50	327	26	71	1,664	2,088
North Central (Dist. 7-B & 9)	69	35	1	33	187,892	3,210	2,920	2	0	0	20	22	142	2	19	656	819
West (Dist. 7-C & 8)	97	73	1	‡23	459,227	3,176	2,104	1	0	0	13	14	68	2	2	318	390
Panhandle (Dist. 10)	34	24	8	2	105,314	603	647	0	0	0	0	0	1	0	2	12	15
Eastern (Dist. 5, 6, & 6-P)	29	20	1	§8	127,027	775	538	0	0	0	4	4	9	4	2	134	149
Gulf Coast (Dist. 2 & 3)	43	28	1	14	234,071	1,482	1,329	0	1	0	5	6	56	11	25	235	327
Southwest (Dist. 1 & 4)	44	30	2	12	212,750	1,355	1,307	0	0	0	4	4	51	7	21	309	388
Louisiana	51	36	4	11	305,140	1,597	1,474	1	1	0	3	5	33	14	5	133	185
Northern	28	20	3	5	80,831	853	839	0	0	0	0	0	4	2	2	61	69
Southern	23	16	1	6	214,309	744	635	1	1	0	3	5	29	12	3	72	116
Arkansas	4	1	1	2	20,892	265	211	1	0	0	1	2	8	0	0	64	72
Mississippi	8	3	0	5	55,034	211	233	0	0	0	3	3	8	2	0	76	86
Southeastern States	2	1	0	1	7,348	44	34	0	0	0	0	0	1	0	1	24	26
Montana	5	3	0	2	22,659	147	163	0	0	0	3	3	1	0	0	25	26
Wyoming	16	7	2	7	72,818	373	396	2	0	0	2	4	16	0	0	48	64
Colorado-Utah	4	2	0	2	20,447	51	83	1	0	0	2	3	4	0	0	32	36
New Mexico	12	6	0	6	76,832	407	346	0	0	0	2	2	10	1	0	37	48
California	38	20	2	16	118,807	1,151	1,704	1	0	0	12	13	16	0	2	249	267
Miscellaneous	0	0	0	0	0	34	15	0	0	0	0	0	0	0	0	9	9
Total United States	907	485	66	356	3,198,412	27,367	24,982	21	2	0	131	154	712	49	121	4,055	4,937
Total previous week	906	504	50	352	3,341,463	....	....	34	0	4	152	190	691	47	121	3,924	4,783
Total August 26, 1949	717	395	54	268	2,632,687	....	....	17	1	4	115	137	626	58	127	3,595	4,406

Service wells included: *8, †7, ‡1, §2.



DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 26 crude oil	B. of M. Aug. demand	Aug. 19 crude oil
Alabama	1,950	1,600	1,950
Arkansas	82,350	90,000	82,250
California	890,600	905,000	887,500
Colorado	63,700	67,000	62,000
Eastern	61,800	64,000	62,950
Florida	1,500	1,400	1,500
Illinois	174,700	186,000	174,600
Indiana	31,000	31,000	31,700
Kansas	303,900	298,000	306,800
Kentucky	27,700	30,000	28,100
Louisiana	574,800	578,000	574,800
North Louisiana	116,250	.....	116,250
South Louisiana	458,550	.....	458,550
Michigan	45,900	47,000	44,400
Mississippi	109,550	113,000	109,400
Montana	23,600	24,000	23,300
Nebraska	2,600	3,000	2,550
New Mexico	135,575	150,000	135,575
Oklahoma	466,300	455,000	468,050
Texas	2,463,950	2,240,000	2,463,950
Dist. 1 (Southwest)	29,400	.....	29,400
Dist. 2 (Southwest)	140,425	.....	140,425
Dist. 4 (Southwest)	222,400	.....	222,400
Dist. 3 (Gulf Coast)	432,450	.....	432,450
Dist. 5 (Eastern)	41,050	.....	41,050
Dist. 6 (Eastern)	97,650	.....	97,650
East Texas field	274,800	.....	274,800
Dist. 7-C (West)	61,350	.....	61,350
Dist. 8 (West)	846,100	.....	846,100
Dist. 7-B (W. Central)	72,325	.....	72,325
Dist. 9 (N. Central)	154,000	.....	154,000
Dist. 10 (Panhandle)	92,000	.....	92,000
Utah	3,400	4,000	3,350
Wyoming	160,800	162,000	155,800
Total United States	*5,625,675	5,450,000	5,620,525
Change from previous week, up	5,150		
Canada	88,330	.....	86,680
Total U. S. production January 1-August 26	†1,235,740,205 bbl.		
Same period last year (crude plus cond.)	1,210,217,015 bbl.		

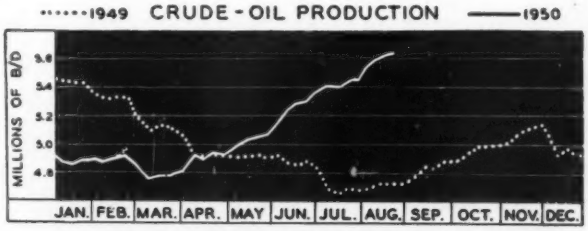
*Not incl. 96,495 bbl. condensate. †Incl. 23,163,105 bbl. condensate.

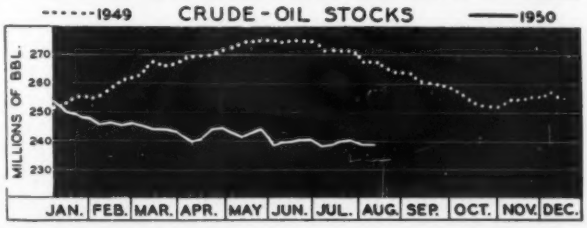
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

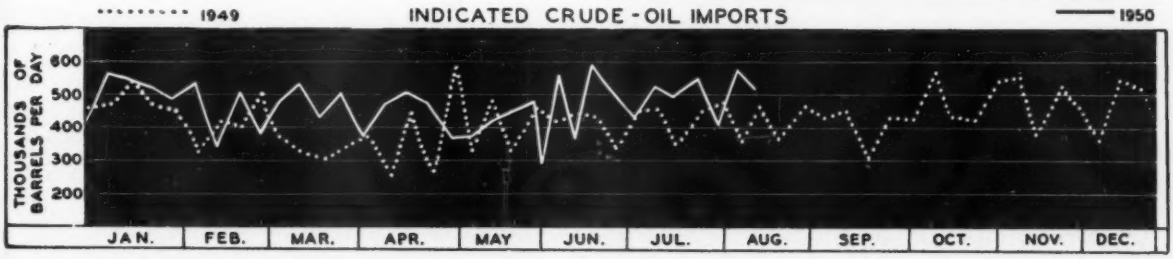
(Thousands of barrels)

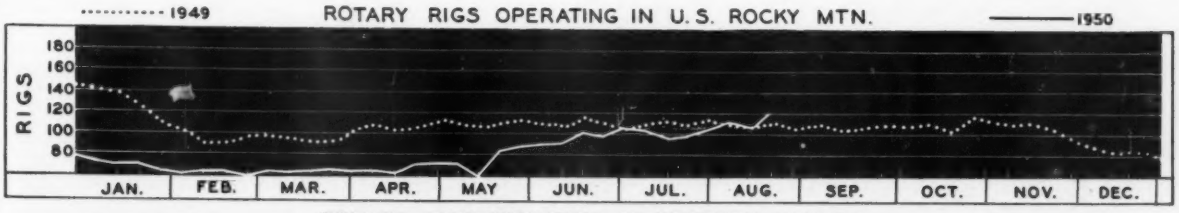
	Aug. 19, 1950	Aug. 12, 1950	Aug. 20, 1949
Pennsylvania Grade	2,641	2,748	3,409
Other Appalachian	1,200	1,488	2,025
Illinois, Indiana, Michigan	9,410	9,230	13,514
Arkansas	2,810	2,792	2,977
Louisiana	14,860	14,483	14,829
North	2,998	3,134	3,683
Gulf	11,862	11,349	11,146
Mississippi	2,479	2,266	2,794
New Mexico	5,875	6,031	7,782
Oklahoma and Kansas	33,487	33,007	39,282
Texas	113,945	113,833	123,372
East Texas	14,469	14,702	16,345
West Texas	42,291	43,526	49,491
Texas Gulf	28,481	27,391	30,025
Other Texas	28,704	28,214	27,511
Rocky Mountain	11,480	11,925	14,143
California	33,015	33,871	35,290
Foreign	7,259	6,883	7,038
Total	238,461	238,554	266,455

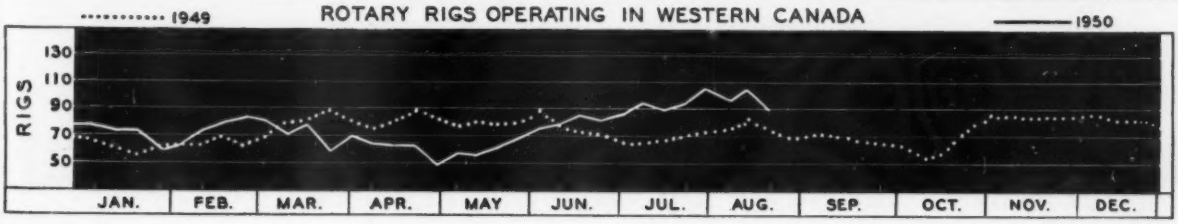
*Bureau of Mines







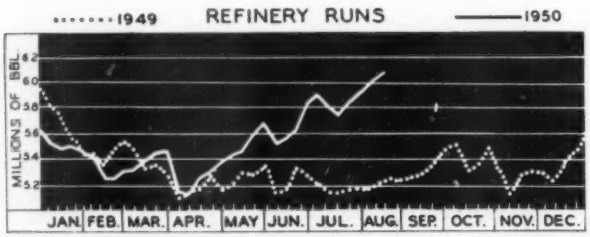


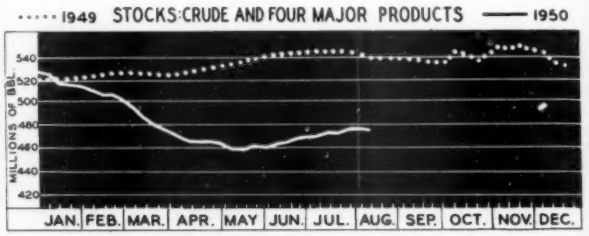


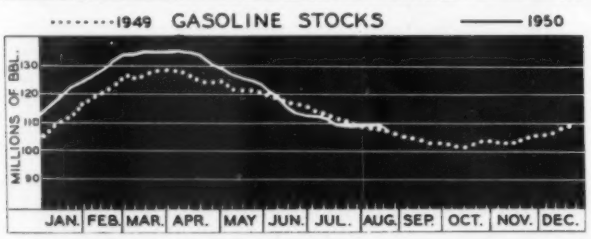
A.P.I. REFINERY REPORT, AUGUST 19
(Thousands of barrels)

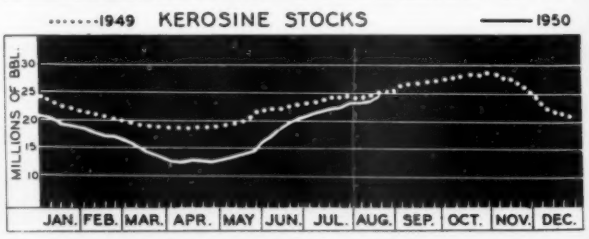
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, August 1949: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	980	412.7	40.4	215.4	220.0	25,470	8,006	16,746	11,673	746	317.5	26.6	168.2	182.0
Appalachian:														
District 1	101	42.4	4.0	13.7	14.3	2,252	436	639	386	84	39.7	4.2	10.6	9.2
District 2	71	36.4	3.7	7.0	14.7	999	145	170	254	63	34.8	3.9	4.5	11.5
Ind., Ill., Ky.	1,063	627.4	63.9	161.9	128.3	22,416	5,163	11,193	4,448	882	486.6	45.0	120.1	118.0
Okla., Kans., Mo.	522	295.6	13.0	116.3	65.1	10,428	1,383	6,356	1,269	430	242.8	15.2	81.6	60.5
Inland Texas	230	146.2	10.7	32.9	43.7	3,178	560	1,275	853	218	144.7	7.1	29.2	43.0
Texas Gulf Coast	1,382	697.4	98.0	292.9	253.2	16,065	3,953	10,450	4,740	1,252	607.8	68.9	222.2	232.0
La. Gulf Coast	486	238.9	63.6	75.7	62.3	6,020	2,866	3,296	1,832	426	222.8	40.1	110.0	49.0
N. La. and Ark.	73	27.0	6.3	14.1	13.0	2,445	460	712	298	78	32.1	6.2	12.4	15.5
Rocky Mountain:														
New Mexico	15	7.6	.4	1.9	2.9	95	25	58	35	12	6.9	0.1	2.3	3.1
Other Rocky Mtn.	201	89.1	5.0	38.1	37.4	3,635	474	1,835	824	183	81.1	4.8	31.8	37.1
California	975	424.9	14.6	84.4	332.4	15,271	942	12,377	15,396	867	376.4	9.3	109.4	317.0
August 19, 1950	6,099	3,045.6	323.6	1,054.3	1,187.3	108,274	24,413	65,107	42,008	5,241	2,593.2	231.4	902.3	1,077.9
August 12, 1950	6,044	2,900.7	303.0	1,098.1	1,112.4	108,518	23,628	63,053	41,810	.....	.....	.....	.....	.....
August 20, 1949	5,241	2,599.3	233.4	863.1	1,070.9	107,612	25,822	75,312	68,157	.....	.....	.....	.....	.....

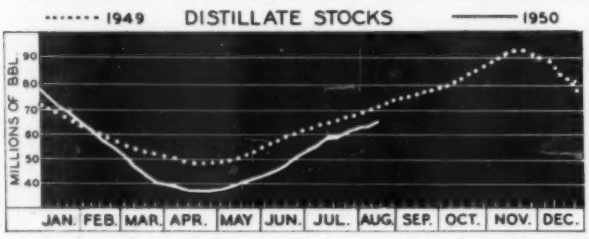
*At refineries including natural blended. †Finished and unfinished.

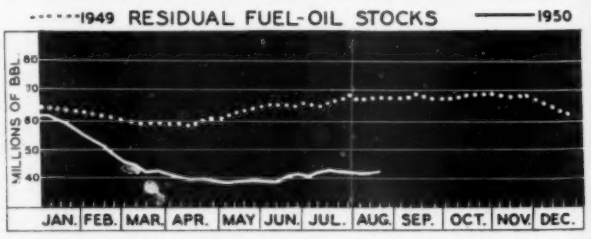


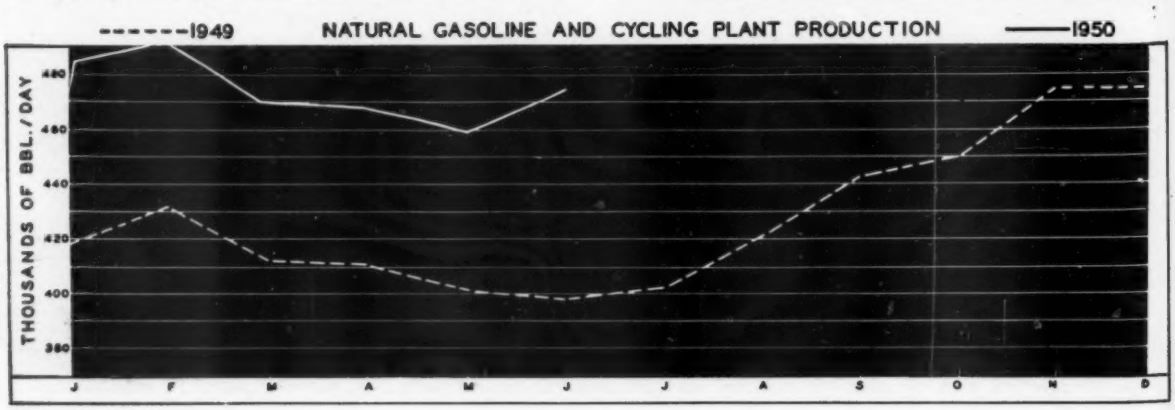












CRUDE PRICES

GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.69	....	....	....
19-19.9	1.77	....	....	....
20-20.9	1.85	$2.25	....	$2.12
21-21.9	1.93	2.27	....	2.14
22-22.9	2.00	2.29	....	2.16
23-23.9	2.08	2.31	....	2.18
24-24.9	2.15	2.33	$2.56	2.20
25-25.9	2.23	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

VARIATIONS in the light-fuel market for areas on the East Coast were clearing up as most suppliers met the maximum increases. The new shifts produced fairly constant quotations for No. 2 fuel at 8.5 cents a gallon for barge deliveries in New York Harbor. Variations in kerosine postings were reduced to a very narrow range with quotations at 9.5 to 9.6 cents.

The effects of the higher East Coast price level on the Gulf Coast market are generally toward a stronger market on the gulf, but these are partially offset by higher tanker rates. Some owners are asking flat Maritime Commission rates in effect June 30, 1948, for clean vessels in the Gulf-East Coast trade. In late May, some material moved at 35 per cent off these rates. The current asking price represents an actual transportation cost of .9 cent a gallon for No. 2 fuel. Thus a marketer cannot pay more than about 7.5 cents on the Gulf if he plans to resell on the New York Harbor market at 8.5 cents.

Marketers are expecting an increase in offerings of light heating oils in September. High distillate demands throughout the summer can be accounted for only on a basis of large sales to both resellers and consumers for storage. Since only primary storage is covered by the weekly and monthly stock reports, sales for reseller and consumer storage become a part of indicated demand. Many suppliers believe that these tanks are almost full and that primary distillate stocks will increase at a faster rate in September and early October.

On the other hand, a larger percentage of the increased residual demand resulted from actual gains in consumption, and the needed stock gains are unlikely unless production is increased.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of August 28, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax. in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.5-12.75	10¾-11½
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11½-12½
42-44 w.w. kerosine	8¾-9	9.5-9.6	8½-8⅝
No. 2 straw fuel oil	8-8⅛	8.5	7½-7¾
No. 6 residual	$1.65-1.75	$2.15	$1.80-1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.05	6.55	6.80

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	14.75
2.000 No. 5-6 neutral	16.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	22-24
200 vis., No. 3 neutral, 0-10 pp.	14.5-15.5

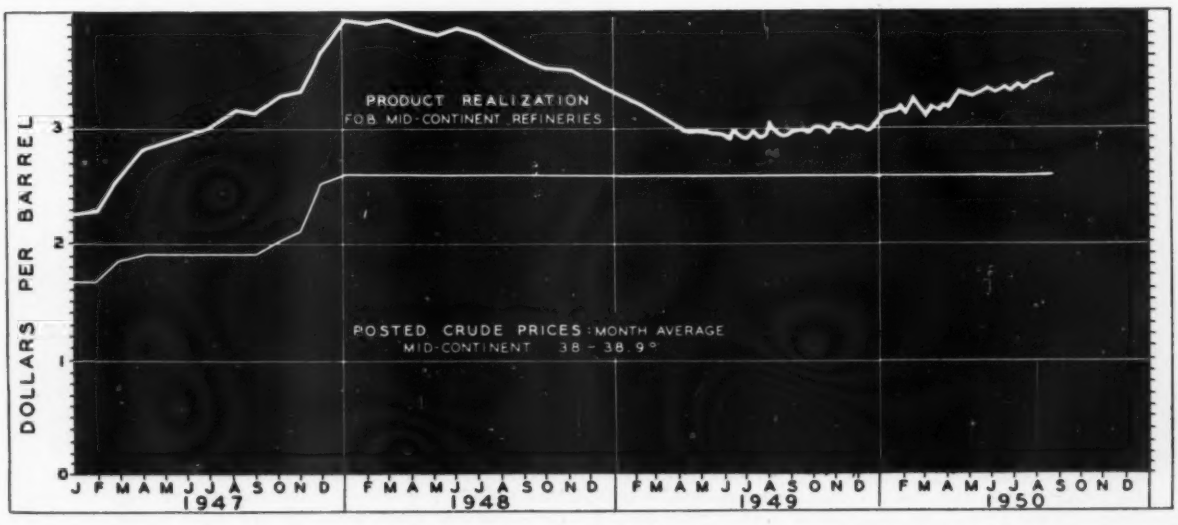
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	27.5
180 vis., 0 p.t. neutral	28.5

WAX

Mid-Continent

132-134 A.M.P.	4.50



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.48 for week ended August 19, $3.45 for previous week, and $2.98 for August 1949.

EQUIPMENT MEN ... in the News

Two United Store Managers Named to Oklahoma District

A. R. BROWN

H. C. THORNTON

Two well-known men in the supply field have been appointed to new positions, it has been announced by H. B. Gutelius, president, United Supply & Manufacturing Co.

H. C. Thornton, 11-year veteran with United, has been named as assistant district manager of Oklahoma with headquarters at Elk City. Thornton, until his recent promotion, had been manager of United store at Elk City.

A. R. Brown, for the last 6 years store manager of the Seminole, Okla., store for United, has also been promoted to assistant district manager of Oklahoma with headquarters in Seminole.

Holland Construction Co. Reenters Pipe-Line Field

H. T. (Bus) Holland, founder of Holland Construction Co., has announced the company's return to active business in the field of pipeline construction. The company, which is opening new offices in the First National Building in Tulsa, is actually already at work on its first contract, constructing 20 miles of 22-in. line for Washington Gas Light Co.

Holland stated that the construction company is completely equipped with new machinery and equipment.

Walker Appointed to New Position With Axelson

J. C. Axelson, president and general manager, Axelson Manufacturing Co., has announced the appointment of J. R. (Jeff) Walker to succeed Alvin (Dutch) Zwerneman as general sales manager of the petroleum equipment division of the firm.

Zwerneman, who had been a vice president of the firm since 1937 and general sales manager of the petroleum equipment division since 1944, resigned early in August to enter into business for himself as manufacturers' agent for petroleum and allied industries throughout the Mid-Continent and Gulf Coast areas. He will make his headquarters in Houston.

Walker, who until his promotion, had been in charge of the company's Mid-Continent division at Tulsa, will move to Los Angeles about the middle of October.

K. S. (Ken) Ramey, formerly in charge of Axelson's California sales division, is being transferred to Tulsa to assume the duties of Mid-Continent sales manager. Willard F. (Bill) Goertz of the California sales division will be advanced to the position of California sales manager.

Blaw-Knox Names Baird to Manage Tulsa Office

C. E. BAIRD

Carl E. Baird has been appointed manager of the Tulsa office of Chemical Plants Division of Blaw-Knox Co. This office serves the gas, natural-gasoline, petroleum, and petrochemical industries with process equipment and complete plants.

Originally of Dallas, and with a background of business experience in the Southwest, Baird has been with Blaw-Knox Co. since 1946. He is a graduate of University of Oklahoma and has had 10 years of engineering experience in the fields served by the Tulsa office.

Welex Jet Opens Office in Tulsa's New 1st National

Welex Jet Services, Inc., Fort Worth, is opening offices in the First National Building in Tulsa, under the executive supervision of Carl J. Hochenauer, veteran oil-field equipment man. The announcement was made by Ray O. Shaffer, Welex president.

Hochenauer is also president of Texoma Supply Co. of Tulsa, exclusive distributors in the Mid-Continent area for Texasteel Manufacturing Co., manufacturers of sucker rods and pumping equipment. Simultaneously, Hochenauer announced that Texoma is also moving into a suite of offices in the new First National Building.

Sawyer Named Assistant to Lincoln Vice President

A. W. Sawyer has been appointed assistant to the vice president of Lincoln Electric Co. of Cleveland. Sawyer is a graduate of Cornell University where he received his degree in mechanical engineering. He had been previously employed by Bell Aircraft of Buffalo.

Sawyer joined Lincoln after his graduation from Cornell and worked in the factory as a methods engineer. Prior to his present appointment he was in charge of development and production of welding instruction aids. In his present position Sawyer will handle government bids and contracts and also conduct Lincoln's educational activities.

Clinton Machine Purchases New Iowa Factory

With the purchase of this large new factory in Maquoketa, Iowa, Clinton Machine Co., Clinton, Mich., has more than tripled its capacity for manufacturing its engines. The Maquoketa plant has 120,000 sq. ft. of floor space under one roof, and it is served by a railroad spur. Related to the purchase of the new plant, Don Thomas, president, announced the appointments of Charles B. O'Neill as executive vice president in charge of production, and of Charles W. Hamilton as sales manager of the firm.

Tesmen Joins Tempil As Sales Engineer

Tempil Corp. has announced the appointment of Arthur B. Tesmen as sales engineer. Before joining Tempil Corp., Tesmen was with North American Philips Co., Inc., in charge of sales-service, promotion, and development of its contact electrodes and other welding products. Prior to that he was with Crucible Steel Co. of America as metallurgical engineer and with the industrial laboratory of the Philadelphia Navy Yard as a welding engineer.

Fluid Packed Pump Co. Expands Sales Force

Fluid Packed Pump Co., Los Nietos, Calif., has recently made extensive promotions, new territory assignments, and additions to its sales force. Sidney Shuman, general sales manager, announces the following appointments:

S. SHUMAN

Glen Peters, assistant to the general sales manager, has moved his office from Oklahoma City to Fort Worth. B. G. Wing, formerly of Ardmore, Okla., is now manager of eastern division located at Olney, Ill., and D. A. McDaniels, formerly of Wichita Falls, Tex., is now manager over North Texas, West Texas, New Mexico, and the Panhandle.

District representative Grady Jennings has been transferred from El Dorado, Ark., to Seminole, Okla. A new employe, C. C. Hignight, assumes the El Dorado post. M. W. Curtis has been employed to assist G. R. Newbolt, division manager of Oklahoma and Kansas. Harold Palmer, formerly district sales manager at Kilgore, Tex., has been promoted to assistant to C. D. Newbolt, division manager over Gulf Coast, East Texas, Louisiana, Mississippi, and Arkansas.

Two additions have been made to the Southwest Texas sales force. Denver Hopkins, formerly of Republic Supply Co., is now located at Hebbronville, Tex., and Frank Quattrini, a new man with the company, is stationed at Sundown, Tex. Another new field salesman is J. A. St. John, formerly of Ibex Petroleum Co., who is at Breckenridge, Tex. T. K. Weller, formerly of Republic Supply Co., is at Kilgore, Tex.

Field salesman William H. Price has been transferred from Santa Maria, Calif., to Russell, Tex. Walter C. Dobbs, Jr., formerly with Eastman Oil Survey, is field salesman at Wichita Falls, Tex. M. C. Watkins, formerly with The Texas Co. at Electra, Tex., is field salesman at Hobbs, N. M. L. E. Loudermilk, formerly with National Supply Co. at Caracas, Venezuela, is now field salesman at Edmonton, Alta., Canada.

Martin Gets Eloy Alfaro International Award

D. J. MARTIN

Daniel J. Martin, vice president in charge of engineering of Hughes Tool Co., Houston, has just been awarded the Cross of the Eloy Alfaro International Foundation. General Eloy Alfaro was one of the most distinguished citizens of the Republic of Ecuador and of the Western Hemisphere. He is credited with having called the first conference of an international nature leading to the promotion of better relations among the American republics. The foundation was organized to pay honor to the memory of this great statesman.

The Cross of the Foundation is presented to those who are considered to have performed outstanding services toward the improvement of international relations among the American republics.

Hagan Establishes New California District Office

A new Los Angeles district office has been established at South Gate, Calif., by Hagan Corp., Pittsburgh combustion and chemical-engineering firm, and its subsidiaries, Calgon, Inc.; Hall Laboratories, Inc.; and Buromin Co.

The office also will represent Bull & Roberts, which is associated with Hagan Corp. and subsidiaries in the marine-engineering field.

Gallaway Elected President Of Industrial Safety Group

C. H. GALLAWAY

Charles H. Gallaway, sales manager of the safety products division, American Optical Co., was elected president of the Industrial Safety Equipment Association at the annual meeting held at White Sulphur Springs, W. Va.

He succeeds Lawrence E. Dickson, president of Standard Safety Equipment Co. of Chicago, who has completed 2 years in office.

(Continued on page 137)

A. O. Smith's Houston Pipe Mill Now in Production

In the flash-welding machine shown at the left in the new Houston plant of A. O. Smith Corp. of Texas, a 40-ft. cylinder is flash-welded simultaneously along its entire length. Edges of the steel cylinder are brought to white heat elecrically, pressure is applied, and the metal is fused.

Production of large-diameter welded steel pipe for the oil and gas industries has begun at the new $5,000,000 plant of A. O. Smith Corp. of Texas in the Houston ship channel industrial area.

The plant, completed on August 1, is now turning out pipe in increasing volume, according to D. F. McCarthy, vice president and general manager of the company. A. O. Smith Corp. of Milwaukee and Sheffield Steel Corp,. a subsidiary of Armco Steel Corp., are joint owners of the mill.

Scheduled for future construction are casing facilities which will be operated in conjunction with the pipe mill. The plant is tooled up, at present, to produce 1,000 miles of 30-in. pipe for Texas-Illinois Pipe Line Co. which will supply natural gas from Southeast Texas to People's Gas Light & Coke Co. of Chicago.

E. L. Evensen, formerly superintendent of the A. O. Smith pipe mill at Milwaukee, has been appointed resident manager of the Houston plant.

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WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

FOR SALE: 300 Amp Westinghouse welding machine powered by 6-BK Waukesha engine. Completely overhauled. Less than 50% of new price. Melton Supply Company, Box 1360, Seminole, Oklahoma.

APPROXIMATELY: 800′ of 16″ 65# & 70#, and 1200′ of 13″ OD 50#, used Seamless Casing, and 200′ of 20″ 90# Casing. Write Box #31, Augusta, Kansas.

FOR SALE: 5000′ rotary rig complete; Wilson Giant draw works powered by two JL-1335 Buda engines compounded. New 96′ L. C. Moore jackknife with base, 7¼″ X 14″ mud pump, 7 X 12 steel tool house, B. J. hook, Emsco swivel, excellent 4½″ drill pipe, and all other equipment to complete rig. Terms if desired. For inventory, write Melton Supply Company, Box 1360, Seminole, Oklahoma.

FOR SALE

9—230 H.P. Bessemer Type 10 Engines with compressors, Steel Buildings, Valves and Fittings complete for installation. Located Salem, Illinois Oilfield.

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Approximately 800 miles of 8″—29.02# line pipe being taken up. This pipe was used in a 650# Pressure Products Line. Pipe Subject to Prior Sale F.O.B. Pittsburgh District.

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Terms
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Write: 302 East Queen Street
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Gaso, Byron Jackson, Aurora, Wayne, Lombard & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

FOR SALE: Model 75 Wichita Trailer Type 3 drum-drilling and clean-out rig, A-mast, 120 HP Waukesha motor, 4500′ of ¾″ drilling & ½″ sand lines, dog house and drilling tools. J. W. Gookin, Box 641, Electra, Texas. Phone 560 or 1188.

Several Army Surplus 4½″ x 6″ Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

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ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
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Tulsa, Oklahoma

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EQUIPMENT FOR SALE

FOR SALE: Drilling Rig: Brewster B0190 draw works W/NKU 210 H.P. Waukesha, 6x16 Gardner-Denver pump W/225 H.P. 6 cylinder LeRoy, with or without 5000' 4½ drill pipe, now drilling 5000' hole near Shreveport. Arthur Arnold, Box 3003, Shreveport, La.

FOR SALE at our Dillard, Oklahoma, warehouse Clark Bob Cat Pumping Engine parts: 4—Rebored Cylinders complete with new piston rings and pins, also parts of two complete engines that can be used for repairs. Westheimer - Neustadt, Ardmore, Oklahoma.

FOR SALE near Vernon, Texas: 1—40 HP Superior, 4 Cycle Gas Engine Driving Power Serial #18611, Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

For Sale At Eunice, New Mexico

1—10,000 Ft. Power Rig complete less drill pipe and drill collars—Wilson Titan Draw Works—3 L.R.O. Waukeshas—A-1 condition.

Approximately 5 acre yard and camp all enclosed by fence. Shop building 60 ft. x 30 ft. Fine for drilling or hauling contractor. All utilities in.

Extra drilling equipment such as swivels, hooks, elevators, links, blow out preventers, mud pumps, engines, etc.

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Ashby Drilling Company

Phone: Logan 6-6639, 3415 Westminster Avenue, Dallas, Texas

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1,250,000' 6" (6⅝" OD x .280" Wall) 18.97# 20' RML Used #1 Lapweld, Beveled Ends. Available for inspection after August 28 with delivery 30 to 60 days. Price on request.

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Hydraulic Casing Pulling Units, Hydraulic Jacks, Casing Spiders, Rings & Slips. Also,
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50,000 ft. 6⅝" OD 17.02 new Youngstown Lapweld, Range 1 Line Pipe. FOB rail point Wyoming. Wire inquiries.
Material subject to prior sale.

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5½" J-55—15½# and 2⅜" OD tubing to trade only for interest or override in proven territory.

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ODESSA, Texas. 30 acres suitable for spur track—Close in—Ideal for any commercial enterprise. Price $30,000. Ray Britton Agency—302 West 5th St., Ph. 2411, Odessa.

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River Oaks Business Property. 70-ft. frontage, corner lot on Westheimer with two-story tile stucco house adjoining Avalon Center. Ample parking facilities. Ideal office or commercial location for oil company or allied field. Price $42,500.

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Pipe Threading Machines

6", 8" and 12"

Landis or Bignall & Keeler with Landis Heads. Machines must be in good working order with individual motor drives. Give complete description including make, model and serial numbers, width of dies or chasers, motor specifications and prices.

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FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

PETROLEUM Engineer or Geologist with experience in evaluation and subsurface studies in Gulf Coast wanted by sound independent. Age 30-45. In application state salary expected and enclose college transcript. Box D-631, The Oil and Gas Journal, Tulsa, Oklahoma.

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Mechanical Draftsman, piping, concrete, pressure vessels, strength of materials. Furnish complete data, salary requirement, military status and sample of work.

Personnel Department, Cities Service Oil Company, Bartlesville, Oklahoma

WANTED
Drilling Superintendent

$850.00 per month and new six-room bungalow. Applicant must be qualified for West Texas area.

Submit qualifications including experience and education. All replies will be treated confidentially. (Our employes know of this advertisement.)

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Tulsa, Oklahoma

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Experience, five years or more, required for Seismic Supervision and Interpretation in Head Office of Major Oil Company operating in Saskatchewan. Salary commensurate with experience and ability.

All replies confidential.

Apply in writing to Chief Geophysicist,

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HELP WANTED

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REFINERY ECONOMIC ANALYST: Integrated petroleum company has opening for chemical engineer to supervise refinery economic analysis group. Position requires minimum of two years' experience in preparation of cost and process studies, familiarity with catalytic cracking, and at least one year of training in accounting and business administration. Age limits 25-35. Address replies to Box D-637, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Geophysicist with geological background for review and interpretation of seismic data. State age, training, experience. Reply Box D-654, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING COMPANY now operating in Permian Basin has opening for capable contact man or person in position to obtain contracts. Salary or interest basis. Replies confidential. Box D-641, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions — $3600 to $30,000. This confidential service for outstanding men who desire a change of connection will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

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OPERATIONS SUPERVISORS
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Only Experienced Men Need Apply
WRITE ONLY
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Aggressive independent producer with AAA-1 rating wants man to head exploration department. Must have degree in geology, minimum of ten years geological experience in Oklahoma, some land department experience preferred. Age 30 to 45. Write giving full details and interview will be arranged. This is permanent and attractive position for right man.

Box D-655, The Oil and Gas Journal, Tulsa, Oklahoma.

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Experienced ENGINEER familiar with Oil Refinery design and capable of estimating process equipment from flow diagrams.

Give full information, experience record and salary expected.

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DISTRICT REPRESENTATIVE, Sales Engineer, Manager for Texas or Gulf Coast. Experienced, capable, widely acquainted. Employed in key capacity, desire position offering better opportunity. Top business, personal references. Box D-657, The Oil and Gas Journal, Tulsa, Oklahoma.

AUDITOR-OFFICE MANAGER, CPA, Fifteen years experience, accounting and taxes, principally oil industry. Desires change. Box D-640, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

GEOLOGIST

28, married with three children, 3 years major oil company surface and subsurface exploration experience. M.S. degree and P-3 C.S. rating. Presently employed, available short notice. Box D-661, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Petroleum Engineer-Geologist desires connection with active independent. Ten years with major companies and private practice in executive supervision of drilling, completion, production, geological and reservoir evaluation work. Prefer interest participation. Excellent references. Box D-632, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Desires position with aggressive company. Thoroughly familiar with subsurface and drilling supervision. Experience in West Texas and Mid-Continent. Box D-649, The Oil and Gas Journal, Tulsa, Oklahoma.

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EXPERIENCED GEOLOGIST-GEOPHYSICIST with thirteen years' service company work United States and Venezuela, including electrical logging, radioactivity logging, dipmeter, side-wall sampling, gun perforating, jet perforating, mud logging, mud control, cuttings and core analysis, etc. Last few years largely administrative and sales. Education includes all academic work for Ph.D. degree. Thirty-five years old, married, two children. Prefer administrative, sales, or combination position with aggressive service company or technical position with major oil company requiring extensive knowledge of any or all of above services, domestic or foreign. Excellent references. Desire personal interview. Box D-658, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

MATERIALS: Refining and Production Materials Man Experienced in Control, Auditing, Inventory, Lease Mapping, and Purchasing. Can furnish best of references. Age 35. Box D-663, The Oil and Gas Journal, Tulsa, Oklahoma.

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San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

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Tulsa, Oklahoma

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The next well you drill will be a producer, if, you use the most unique service of all times, an immediate decision rendered. A demonstration will convince the mind of any man. The gamble is too great, you cannot afford to go without it. Box D-664, The Oil and Gas Journal, Tulsa, Oklahoma.

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WANTED

WANTED: Small producing oil royalties. Also drilling deals. Navarro Royalties Company, Odessa, Texas.

WANTED: SURPLUS Chemicals, Oils, Waxes, Solvents, Wastes and Residues of all kinds. Chemical Service Corporation, 98-06 Beaver St., New York 5, N. Y.

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New Products by a steel foundry now engaged in engineering, casting, machining and assembling of pressure specialties.

Company is also fabricator and producer of quantity stainless steel castings, heat resisting castings, carbon and alloy steel castings, assembled and machined complete.

Address Box D-633,
The Oil and Gas Journal,
Tulsa, Oklahoma

EQUIPMENT MEN

(Continued from page 133)

Golden Anniversary Book To Portray Oil Men

Oil men of Texas and the Southwest are being portrayed both in portraiture and biographically in a volume now being assembled marking the golden anniversary of the discovery of Spindletop. The book represents the first compilation of the history of the individuals in all phases of oil endeavor who have made contribution by their achievements to the progress of the industry in its first 50 years of activity in Texas.

John Morans, internationally known portrait artist, has been commissioned to render the portraits of the "men of oil progress." Already the artist has completed a number of crayon and charcoal sketches of prominent oil leaders including H. R. Cullen, Jim Abercrombie, Roger Henquet, Pierre Slumberger, Walter Goldston, J. Brown Cutbirth, and A. T. (Cap) McDannald.

The detailed story of the Spindletop discovery will preface the portraiture and biographical content of the Golden Anniversary volume and will be edited by Steve Wilhelm, advertising executive and prominent member of the Texas Historical Society. Supplementing this chronology of the oil business in Texas since the turn of the century will be a number of treatises on drilling, refining, geology, production and other phases of the petroleum industry written by prominent members of the oil fraternity.

Thompson Named Assistant Sales Manager by Barton

A. I. THOMPSON

Appointment of Alvah I. Thompson as assistant sales manager of Barton Instrument Corp., Los Angeles, has been announced by Barton Jones, president of the company.

Barton manufactures rupture-proof bellows-type flow meters of the indicating and recording style, and meter bodies.

Thompson came to Barton from Bristol Co., where he was formerly project engineer in charge of aircraft development for 9 years, and later engineer in Los Angeles for 4 years. He is a director in the Southern California Meter Association, and chairman of the membership committee of the Instrument Society of America. He holds a degree in electrical engineering from Renssalaer Polytechnic Institute. Serving under Claude B. Nolte, Barton vice president and sales manager, Thompson, in addition to duties as assistant sales manager, will be in charge of sales in the Southern California territory.

LEGAL

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the NE¼ sec. 22, T. 27 S., R. 23 E., M.D.M., California, 160 acres within the known geologic structure of the Semitropic field (undefined), will be offered for oil and gas leasing through competitive bidding at 1 p.m., Eastern Standard Time September 6, 1950, when bids will be opened. Details of the lease offering, how and where to file bids and a description of the lands may be obtained by addressing an inquiry to the Manager of the Sacramento Land Office, or to this office. Marion Clawson, Director.

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CALENDAR

September

Tri-State Oil Show, Grayville, Ill., September 2-4.

American Chemical Society, 118th national meeting, Stevens Hotel, Chicago, September 3-8.

American Association of Petroleum Geologists and Society of Exploration Geophysicists, regional meeting, jointly with Geological Association of Canada, Banff Springs Hotel, Banff, Alta., Canada., September 5-8.

National Chemical Exposition, Chicago Coliseum, Chicago, September 5-9.

American Institute of Chemical Engineers, regional meeting, Minneapolis, September 10-13.

Instrument Society of America, national exhibit and technical meeting, Coliseum, Houston, September 10-14.

American Petroleum Institute, Division of Transportation, Subcommittee on Products Pipe Line Technology, Lennox Hotel, St. Louis, Mo., September 11-13.

American Society of Mechanical Engineers, and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

National Association of Corrosion Engineers, Shreveport section, school meeting, Caddo Hotel, Shreveport, September 13-15.

American Petroleum Institute, Lubrication Committee, Hotel Traymore, Atlantic City, September 14.

Instrument Society of America, annual instrument conference and exhibit, Municipal Auditorium, Buffalo, N. Y., September 18-22.

American Society of Mechanical Engineers, fall meeting, Hotel Sheraton, Worcester, Mass., September 19-21.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 24-28.

Ohio Mineral Industries Conference, sponsored by Ohio State University and Ohio Department of Natural Resources, Ohio Museum Auditorium, Columbus, September 25-26.

October

Independent Petroleum Association of America, annual membership meeting, Jefferson Hotel, St. Louis, October 2-3.

American Gas Association, annual convention, Atlantic City, N. J., October 2-6

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, Mid-Continent meeting, Roosevelt Hotel, New Orleans, October 4-6.

American Association of Oilwell Drilling Contractors, annual meeting, Mayo Hotel, Tulsa, October 9-10.

Instrumentation for the Process Industries, fifth annual symposium, Texas A. & M. College, College Station, Tex., October 11-13.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, West Coast meeting, Elks Club, Los Angeles, October 12-13.

Oil Progress Week, October 16-21.

American Association of Petroleum Geologists, Pacific Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Economic Paleontologists and Mineralogists, Pacific Coast Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Exploration Geophysicists, Ambassador Hotel, Los Angeles, October 19-20.

Permian Basin Oil Show, Odessa, Tex., October 19-22.

Independent Natural Gas Association of America, annual meeting, Shamrock Hotel, Houston, October 23.

National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, October 30-November 1.

November

Mid-Continent Oil and Gas Association, Louisiana-Arkansas Division, annual meeting, Roosevelt Hotel, New Orleans, November 2-3.

Society of Automotive Engineers, Fuels and Lubricants meeting, Mayo Hotel, Tulsa, November 9-10.

California Natural Gasoline Association, Silver Anniversary, Los Angeles, November 9-10.

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, annual meeting, Grand Central Palace, New York, November 27-December 1.

December

American Institute of Chemical Engineers, annual meeting, Columbus, Ohio, December 3-6.

Interstate Oil Compact Commission, winter meeting, Shamrock Hotel, Houston, December 11-13.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month. Jonathan Club.

Oklahoma Fields

(Continued from page 126)

Lincoln County: Aurora Gasoline 1 Conger, NE NE NW 27-16n-6e, dry, TD 3,367 ft., Oswego 2,905 ft., Verdigris 3,006 ft., Skinner 3,076 ft., Red Fork 3,212 ft., Bartlesville 3,327 ft.

McIntosh County: Autrey & Josephson 1 Jackson, SW SW NW 25-10n-13e, elev. 885 ft., dry, TD 3,762 ft., Bartlesville 1,319 ft., Booch 1,891 ft., Atoka 2,163 ft., Gilcrease 2,605 ft., Wapanucka 3,145 ft., Union Valley 3,450 ft., Cromwell 3,496 ft.

Okfuskee County: Bailey et al 1 Redlogle-Williams, SW SW NE 10-13n-8e, elev. 838 ft., dry, TD 4,148 ft., Big lime 2,308 ft., Oswego 2,375 ft., Prue 2,391 ft., Union Valley 3,516 ft., Hunton 3,985 ft., Sylvan 3,997 ft., Viola 4,076 ft., Wilcox 4,139 ft.

Pawnee County: Gillespie & Sons 1 Norris, NE SW SE 4-22n-5e, elev. 1,020 ft., dry, TD 3,672 ft., Oswego 2,862 ft., Red Fork 3,266 ft., Mississippian 3,371 ft., Woodford 3,615 ft.

R. H. Vise 1 Ridley, SE SE SW 30-23n-3e, elev. 894 ft., dry, TD 2,750 ft., Avant 2,316 ft., Hogshooter 2,721 ft., Layton 2,724 ft.

Wyoming Oil & Gas 1 Mitchell, SW SW NW 3-23n-5e, elev. 909 ft., dry, TD 3,472 ft., Oswego 2,624 ft., Verdigris 2,819 ft., Mississippi chat 3,131 ft., Mississippi lime 3,191 ft., Misener 3,455 ft., Wilcox 3,458 ft.

Pottawatomie County: Falcon-Seaboard 1 Unzer, NE NE SE 4-9n-2e, dry, TD 5,540 ft., Tonkawa 3,135 ft., Hogshooter 3,765 ft., Earlsboro 5,243 ft., Woodford 5,435 ft., Hunton 5,478 ft.

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XUM

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Now... Yoloy Pipe

CONTINUOUS WELD

for use where corrosion is a problem

FOR fifteen years, Yoloy steel has been manufactured as Seamless pipe, sheets, plates and structural members. Yoloy is used in the oil, mining, railroad, chemical, trucking and other industries where resistance to corrosion and abrasion are a problem and lighter weight construction is important. Now this same unique nickel-copper low-alloy steel is available as continuous weld pipe.

Yoloy continuous weld pipe has these outstanding characteristics:

1. It is easy to weld,
2. It bends and fabricates readily,
3. Its tensile strength is high,
4. It is resistant to abrasion,
5. Its resistance to shock and vibration is high,
6. It is high in corrosion resistance.

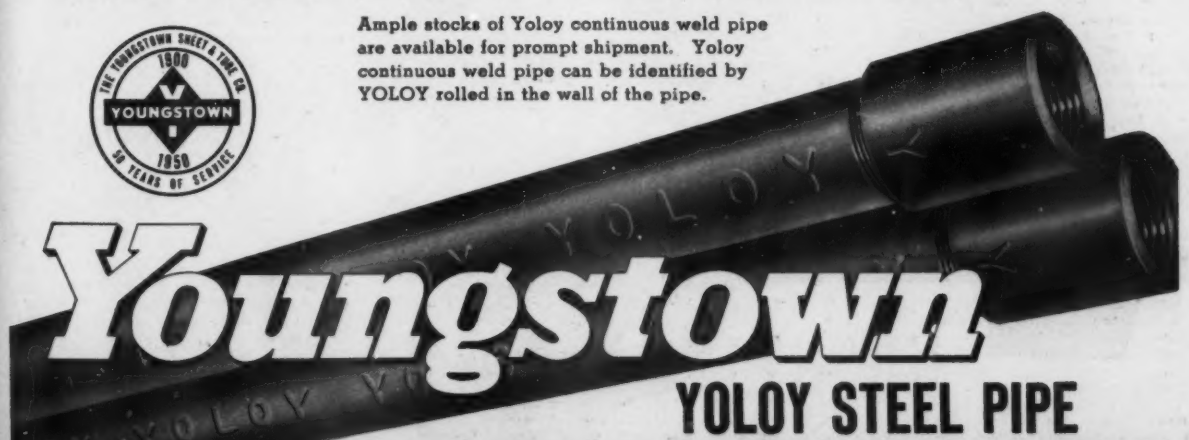
Yoloy has an atmospheric corrosion resistance from four to six times that of regular carbon steels. Its resistance to many other corrosive elements likewise is high, making Yoloy pipe particularly well adapted for use in the railroad, oil, mining and chemical process industries. Youngstown Yoloy continuous weld pipe also affords distinct advantages for use where piping is concealed in industrial plants, commercial buildings and residences.

For example, at a sewage plant, Yoloy pipe immersed in the sour sludge of a digester was found to be in good condition after nearly four years. When repairs were made to replace a mild steel tripod holding the pipe after only one year's service, it was found that the tripod had been almost entirely eaten up by the acid sludge.

Yoloy continuous weld pipe installed in brine lines from the wells at a salt plant is still in service after several years. Pipe previously used in this same line had to be replaced 3 or 4 times a year.

Other examples of the unusual service given by Yoloy pipe can be cited. For further information, write or phone the Youngstown District Sales Office nearest you.

Ample stocks of Yoloy continuous weld pipe are available for prompt shipment. Yoloy continuous weld pipe can be identified by YOLOY rolled in the wall of the pipe.



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YOLOY STEEL PIPE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices — Youngstown 1, Ohio

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XUM

Here's why HUGHES OSC series bits get more hole quicker in soft formations

The Hughes OSC rock-bit series is particularly designed for formations of low compressive strength in which soft, plastic, adhesive materials are frequently encountered. Such materials cannot be removed efficiently by chipping alone. You need a tooth action that will penetrate, move the formation and tear it loose.

This tooth action can be demonstrated with a knife and modeling clay. If you stick a knife blade into the clay, and then pull it out, you don't remove any material. The best way to remove a piece of the clay is to push the blade in, twist and scoop out. This is the principle on which the Hughes OSC series of rock bits is designed.

The twisting, tearing action of the long, coarse-pitched teeth enables the bit to scoop the formation in this manner without balling up. The intermeshing feature of the Hughes Tri-Cone bit, plus the scientifically directed jetting action, assures the most efficient cleaning. That's why, on rig after rig, you'll find Hughes OSC series bits in the hole!

HUGHES OSC SERIES TRI-CONE ROCK BITS

HUGHES

TOOL COMPANY

HOUSTON, TEXAS

World Standard of the Industry

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